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VOLUME 10, NUMBER 6
MARCH 15, 1977

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# SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

**VOLUME 10, NUMBER 6**
MARCH 15, 1977

W77-02576 -- W77-03075

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

# FOREWORD

**Selected Water Resources Abstracts,** a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

**Selected Water Resources Abstracts** is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the Bio-Science Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
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06 WATER RESOURCES PLANNING
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ABSTRACT SOURCES

# SELECTED WATER RESOURCES ABSTRACTS

## 1. NATURE OF WATER

### 1B. Aqueous Solutions and Suspensions

**HETEROGENEOUS SENSITIZED DECOMPOSITION OF WATER WITH SUNLIGHT,**
Exxon Research and Engineering Co., Linden, N.J.
For primary bibliographic entry see Field 2K.
W77-02819

## 2. WATER CYCLE

### 2A. General

**URBAN HYDROLOGICAL MODELING AND CATCHMENT RESEARCH IN CANADA,**
Canada Centre for Inland Waters, Burlington (Ontario).
J. Marsalek.
Reprint of Technical Memorandum No IHP-3, ASCE Urban Water Resources Research Program, American Society of Civil Engineers, New York, N.Y. June 1976; Technical Bulletin No 98, 1976. 52 p, 6 fig, 7 tab, 58 ref, 2 append.

Descriptors: *Canada, *Hydrology, *Model studies, Sewers, Urban runoff, Flow, Land use, Data collections, Planning, Storm runoff, Urbanization, Watersheds(Basins), Effects, Monitoring, Overflows, Waste water treatment, Design storm, On-site data collections.
Identifiers: Runoff quality, Undesirable trends, *Urban watersheds.

Results of a critical survey of urban test catchment research and urban hydrological modelling in Canada are presented. A catalogue of selected urban test catchments and related research projects was prepared. Information on catchment characteristics, instrumentation, data acquired, analysis performed and data applications was included. The Section on Urban Hydrological Modeling includes descriptions of newly developed models, modifications and refinements of some existing models and selected Canadian engineering applications of urban runoff models. There is a lack of urban runoff data or on-site data collections in Canada. It is recommended that more data collections be made to verify non-calibrated model results. (Environment Canada)
W77-02754

**URBAN DRAINAGE MODEL COMPARISON FOR A CATCHMENT IN HALIFAX, NOVA SCOTIA,**
Nova Scotia Technical Coll., Halifax.
D. H. Waller, W. A. Coulter, W. M. Carson, and D. G. Bishop.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 43, Environmental Protection Service, Environment Canada, Ottawa, Canada, August 1976, 35p., 25 fig., 6 tab, 11 ref. 74-8-2.

Descriptors: *Urban runoff, *Rainfall, *Data collections, *Model studies, Storm runoff, Flows, Hydrographs, Costs, Watersheds(Basins), *Canada, *Urban drainage, Watershed management.
Identifiers: *Halifax, Nova Scotia, Road Research Laboratory(RRL) Model, United Kingdom, Storm Water Mangement model.

Rainfall-runoff data were collected for a 167.2 acre combined sewer drainage area at Halifax, Nova Scotia. These data were used to compare the performance of the U.K. Road Research Laboratory (RRL) runoff model and the RUNOFF block of the U.S. Environmental Protection Agency Storm Water Management Model. Both models were capable of producing creditable results for a sewerage system that included surcharged pipes and yielded runoff from previous areas in major storms. Calculated peaks were generally earlier and higher than observed values. Agreement improved with the magnitude of storm events. Hydrographs from the models were more similar than were calculated and observed results, especially in larger storm events. The EPA RUNOFF block required more computer time than the RRL model. (Environment Canada)
W77-02764

**EFFECTS OF MAN ON THE INTERFACE OF THE HYDROLOGICAL CYCLE WITH THE PHYSICAL ENVIRONMENT.**
For primary bibliographic entry see Field 4D.
W77-02771

**HYDROLOGY,**
Geological Survey, Raleigh, N.C. Water Resources Div.
For primary bibliographic entry see Field 6B.
W77-02968

**HYDRAULIC SIMULATION USING DISTRIBUTED PARAMETERS,**
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
L. F. Huggins, T. H. Podmore, and C. E. Hood.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 078, Price codes: A04 in paper copy, A01 in microfiche. Purdue University Water Resources Research Center, Technical Report No. 82, (1976). 59 p, 7 fig, 11 tab, 16 ref, append. OWRT A-027-IND(2).

Descriptors: *Rainfall-Runoff relationships, *Agricultural runoff, *Overland flow, *Agricultural watersheds, Runoff, Hydrographs, Infiltration, Rainfall intensity, Topography, Erosion control, Sediment yield, Hydraulic similitude, Hydraulic models, Model studies, Path of pollutants.
Identifiers: Distributed parameters, Surface retention, Groundwater percolation.

The distributed watershed model developed was based upon the premise that a watershed could be subdivided into a grid of square elements each sufficiently small in size that all hydrologically significant factors would be uniform within its boundaries. In addition to the resulting ability for simultaneously quantifying the hydrologic performance of every point within the watershed being modelled, this approach allows the use of plot and laboratory data to develop model parameters. A laboratory flow table was constructed which provided simulated rainfall and overland flow on full-scale watershed elements representative of various surfaces. This apparatus was used to study flow over three 'uniformly rough' surfaces created from various sand and gravel-sized particles. A radio telemetry system was designed for the collection of data in the field. Research was directed toward the following objectives (1) development of a parametric relationship between overland flow rate, average flow depth, hydraulic roughness and average slope; (2) evaluation of various techniques to quantify physical surface roughness; and (3) correlation of physical roughness parameters with hydraulic roughness coefficients. The distributed parameter watershed models offer significant advantages to the more conventional lumped models for small watershed and is especially valid for applications related to non-point source pollution. (Wiersma-Purdue)
W77-03001

### 2B. Precipitation

**NOAA'S ACTIVITIES IN ENERGY RELATED MEASUREMENT AND MONITORING,**
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 5G.
W77-02652

**ESTIMATION OF DAILY PRECIPITATION OVER CHINA AND THE USSR USING SATELLITE IMAGERY,**
National Environmental Satellite Service, Washington, D. C.
W. A. Follansbee.
NOAA Technical Memorandum NESS 81, September 1976. 33 p, 20 fig, 5 tab, 6 ref.

Descriptors: *Precipitation(Atmospheric), *Clouds, *Meteorological data, Model studies, Rain, Storms, *Asia.
Identifiers: *China, *USSR, Satellite imagery, Infrared imagery, Data analysis.

A technique for estimating precipitation over China and the USSR in late autumn, winter, and early spring, using satellite data is described. The data consisted of NOAA-4 infrared imagery taken at approximately 9 a.m. and 8 p.m., local time, and visual pictures taken near 9 a.m. local time, all with one-half mile resolution. The major human input to the technique is identification of precipitating clouds in the infrared imagery, aided by inspection of the visual pictures. The technique consists of three steps: delineate the area(s) covered by precipitating clouds in each of two consecutive infrared images taken at approximately 12-hour intervals; using cloud motion models developed for the purpose, delineate the envelope of precipitation and isopleths of duration of precipitation in hours; and using an empirically derived relationship between duration of precipitation and the percentage of monthly normal precipitation, estimate amounts of precipitation for the 12-hour period at each grid point in the area of interest. (NOAA)
W77-02663

**ECONOMICS OF STORM PROTECTION,**
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 6F.
W77-02672

**A SHEARED COORDINATE SYSTEM FOR STORM SURGE EQUATIONS OF MOTION WITH A MILDLY CURVED COAST,**
National Weather Service, Silver Spring, Md. Techniques Development Lab.
C. P. Jelesnianski.
NOAA Technical Memorandum NWS TDL-61, July 1976. 56 p, 10 fig, 10 ref, 3 append.

Descriptors: *Storm surge, *Storms, United States, Coasts, Numerical analysis, Mathematical models, Equations.
Identifiers: *Storm tracks, *Tropical storms, *Sheared coordinate system, Equations of motion.

To improve numerical computations of coastal storm surges, a mildly curved coastline is shifted or sheared onto a straight 'baseline'. A surface plane, truncated from the ocean shelf and containing the curved coast as a boundary, is fitted with a curved, non-orthogonal grid. The plane with curved boundaries is then transformed via a sheared coordinate system onto an image rectangle. In the transformed system, the computational grid is cartesian, orthogonal, equally spaced, and the coast lies exactly on and not across a grid line. Linearized transport equations of motion for storm surges are modified to accommodate the sheared coordinate system. A surge model, incorporating the sheared system, is now fully opera-

tional for 3000 mi. of United States coasts, from the Mexican.American border in the Gulf of Mexico to the east end of Long Island, New York. The model can run with curvilinear storm tracks, changing storm celerity along the track, and changing storm parameters such as intensity and size. (NOAA)
W77-02674

**RECONSTRUCTION OF SOME OF THE EARLY STORM SURGES ON THE GREAT LAKES,**
Department of the Environment, Ottawa (Ontario). Ocean and Aquatic Affairs.
For primary bibliographic entry see Field 2H.
W77-02797

**OPTIMAL RAINGAGE DENSITIES AND ACCUMULATION TIMES: A DECISION-MAKING PROCEDURE,**
Oklahoma Univ., Norman. Dept. of Meteorology.
A. Eddy.
Journal of Applied Meteorology, Vol 15, No 9, p 962-971, September 1976. 12 fig, 3 ref. Bu. Rec. 14-060-D-7633.

Descriptors: *Rainfall, *Rain gages, *Networks, *Illinois, Network design, Data processing, Model studies, Mathematical models, Measurement, Rain, Precipitation(Atmospheric), Analytical techniques, Meteorology.
Identifiers: Raingage densities, Accumulation times.

The requirement addressed by this study is that of estimating the rainfall over a given area within a given accuracy. Decision criteria were given explicitly, historical data sets were used to obtain the necessary statistics, an optimal interpolation objective analysis (x,y,t) was used to estimate the rainfall, and specific gage density and accumulation times were deduced. Some of the hazards associated with the modeling were discussed. (Sims-ISWS)
W77-02798

**ACID PRECIPITATION,**
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
G. E. Likens.
Chemical and Engineering News, Vol. 54, No. 48, p 29-44, November 22, 1976. 19 ref.

Descriptors: *Chemistry of precipitation, *Precipitation(Atmospheric), *Hydrogen ion concentration, Rainfall, Snowfall, Acidity, Acidic water, Lakes, Aerosols, Fish, Pollutants, Air pollution, Air pollution effects, Path of pollutants, Water pollution , Water pollution sources, Sulfur, Nitrogen, Fossil fuel, Chemistry, Meteorology.
Identifiers: *Acid precipitation.

The acidity of rain and snow falling on widespread areas of the world has been rising during the past two decades or so. The consequences of this phenomenon have yet to be fully evaluated, but acid precipitation clearly seems to have had a far-reaching environmental impact. It has been linked to sharp declines--in some cases to the point of total extinction--in the number of fish in many lakes and streams. Evidence also suggests that acid rain, snow, and aerosol particles may be damaging trees and other plants. In addition, the increased acidity enhances the weathering and corrosion of materials and buildings. Some scientists also suggest that acid aerosols are an added threat to human health. Nevertheless, there is still considerable disagreement about the sources for the acid-forming components and about the severity of the effects. The long-run social and economic problems associated with acid precipitation and its control are particularly complex and vexing since rain and snonw are not confined by existing political boundaries. To explore these problems and to get a clearer picture of the cause and effect of acid precipitation, research activity has recently blossomed in the U.S. and aboard. The results of this research were reviewed in this paper. (Sims-ISWS)
W77-02800

**THE MEASUREMENT AND ESTIMATION OF POTENTIAL EVAPOTRANSPIRATION,**
SCITRAN, Santa Barbara, Calif.
For primary bibliographic entry see Field 2D.
W77-02802

**MICROCLIMATIC PATTERNS ON THE ARID LANDS ECOLOGY RESERVE,**
Northwest Coll. and Univ. Association for Science, Richland, Wash.
J. T. Rotenberry, W. T. Hinds, and J. M. Thorp.
Northwest Science, Vol 50, No 2, p 122-130, 1976. 4 fig, 4 ref.

Descriptors: *Microclimatology, *Arid lands, Climatology, Mathematical models, *Washington, Climates, Climatic data, Meteorology, Weather data, Precipitation(Atmospheric), Rainfall, Deserts, Isohyets, Isotherms, *Micrometeorology, Correlation analysis, Mathematical studies, Ecosystems.

Within zonal climates, which are determined by latitude, distance from oceans, and elevation, lie a multitude of microclimates which are largely distinguished by localized differences in slope, exposure, elevation and local topography. Plants and animals usually are adapted to the zonal climates, but they must live in or avoid the microclimates. Cluster analysis of correlation coefficients is employed to detect microclimatic patterns within a 27-station network in a topographically diverse region of southeastern Washington. The data consist of monthly precipitation and maximum and minimum temperatures. A mathematical model was employed to determine the similarity in pattern between any two stations. Precipitation patterns showed the greatest variability of the three measures considered. The analyses show that patterns of temperature and precipitation may produce significantly different microclimatic patterns. Further research in relating microclimates to landscapes and plant community structure to the various microclimatic variables or clusters that have been measured is suggested. (Jamail-Arizona)
W77-02870

**COLORADO RIVER BASIN PILOT PROJECT, COMPREHENSIVE EVALUATION REPORT, FIVE WINTER SEASONS 1970-71 TO 1974-75,**
Aerometric Research Inc., Goleta, Calif.
For primary bibliographic entry see Field 3B.
W77-03060

## 2C. Snow, Ice, and Frost

**AN ANALYSIS OF GREAT LAKES ICE COVER FROM SATELLITE IMAGERY,**
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
B. B. Hagman.
NOAA Technical Memorandum ERL GLERL-9, April 1976. 15 p, 3 ref, 5 tab, 2 fig.

Descriptors: *Great Lakes, *Ice cover, *Remote sensing, Reflectance, Measurement.
Identifiers: *Satellite imagery, *Navigation season, Surface reflectance.

Remotely sensed satellite data present a synoptic view of the distribution and extent of the Great Lakes ice cover. Although there are several reasons for extracting ice-cover information from satellite imagery, the major reason is the desire to extend the navigation season on the Great Lakes. One method of obtaining this type of information is to measure satellite transparency density and then correlate calculated surface reflectance with ice-cover concentration. But the use of transparencies presents several difficulties, such as the problem of variable film densities. Because of the variability inherent in satellite transparencies and inaccurate ground verification data, it is desirable to find a better method of extracting ice-cover information. (NOAA)
W77-02676

**GREAT LAKES ICE COVER, WINTER 1974-75,**
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
G. A. Leshkevich.
NOAA Technical Report ERL 370-GLERL 11, March 1976. 43 p, 29 fig, 2 ref, append. Also as GLERL Contribution No. 78.

Descriptors: *Great Lakes, *Ice cover, *Meteorological data, *Iced lakes, *Lake ice, *Weather data, Data processing, Charts, Climatic data.
Identifiers: *Ice charts.

From ice-cover data received at the Great Lakes Environmental Research Lab. during the past winter, twenty composite ice charts were produced to illustrate estimated ice distributions and concentrations on the Great Lakes at weekly intervals from mid-December, 1974, through the end of April, 1975. Freezing degree-day accumulations indicate that the 1974-75 winter was near normal for Lakes Superior, Michigan, and Huron, but between mild and normal for Lakes Erie and Ontario. Accumulations were near their seasonal maximum near mid-April on northern portions of the Great Lakes and at mid-March on southern portions. Skim ice was reported in late November, but it wasn't until near mid-January that rapid and extensive ice growth took place. Ice growth continued through mid-February, when ice covers reached their maximum extent on all the lakes with the exception of Lakes Superior and Ontario, where they occurred near mid-March. Maximum ice extent was estimated to be 30% on Lake Superior, 25% on Lake Michigan, 45% on Lake Huron, 80% on Lake Erie, and 16% on Lake Ontario. Warmer temperatures during the latter part of February caused significant loss of ice on all of the lakes. Last reports of ice on the northern lakes came during the latter part of April. (NOAA)
W77-02677

**WINTER RUNOFF FROM AN URBAN CATCHMENT, (JANUARY TO MARCH 1974),**
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02739

**BEHAVIOUR OF OIL SPILLED IN ICE-COVERED RIVERS,**
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 5B.
W77-02760

**STRAIN RATE EFFECT ON THE STRENGTH OF FROZEN SILT,**
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 8D.
W77-02804

**ICE FLUSHING FROM ST. LAWRENCE SEAWAY LOCKS; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02953

## 2D. Evaporation and Transpiration

**THE MEASUREMENT AND ESTIMATION OF POTENTIAL EVAPOTRANSPIRATION,**
SCITRAN, Santa Barbara, Calif.
U. Wendling.
NASA Technical Translation F-16, 671, December 1975. 25 p, 4 fig, 6 tab, 21 ref. Translated from Zur Nessung und Schatzung der potentiellen Verdunstung, Zeitschrift fur Meteorologie, Vol. 25, No. 2, p 103-111, 1975.

Descriptors: *Evapotranspiration, *Forest watersheds, *Measurement, *Instrumentation, Estimating, Reservoirs, Formulation, Meteorological data, Precipitation(Atmospheric), Groundwater, Equation, Probability.
Identifiers: *Potential evapotranspiration, *Thornthwaite, *Turc, Evapotranspiration instrument, Formulas, Forested land.

Values of potential evapotranspiration, measured over 10 years by a Thornthwaite evapotranspiration instrument (modified by Mather), were compared with estimates made by various formulas. The method most suitable for the assessment of the potential evapotranspiration on the bsis of readily available meteorological data was the one by Turc, which provided values that were, on the average, lower by 6%. The evapotranspiration installation designed by Thornthwaite was based on maintaining a constant water content near the field capacity in a sufficiently large evaporation container filled with earth and covered with growing grass. In this study, a constant groundwater level adjusted itself in the evaporation container by means of a float system. Depending on the ratio of precipitation and evaporation, a certain amount of water flowed in or out past valves and could be measured. (Roberts-ISWS)
W77-02802

**STRUCTURAL COMPOSITION AND SOME PROBLEMS OF THE WATER REGIME OF DARK-CHESTNUT SOILS OF THE KUSTANAI OBLAST IN CONNECTION WITH THE DURATION OF THEIR CULTIVATION, (IN RUSSIAN),**
For primary bibliographic entry see Field 2G.
W77-02853

**COMPARISON OF IRRIGATION SCHEDULES BASED ON PAN EVAPORATION AND GROWTH STAGES IN WINTER WHEAT,**
Punjab Agricultural Univ., Ludhiana (India).
For primary bibliographic entry see Field 3F.
W77-02857

**COMPARATIVE MORPHOLOGICAL AND ECOPHYSIOLOGICAL ASPECTS OF TWO SCLEROPHYLLOUS CHILEAN SHRUBS,**
Universidad Catolica de Chile, Santiago. Laboratorio de Botanica; and Universidad Catolica de Chile, Santiago. Inst. of Biological Sciences.
For primary bibliographic entry see Field 3B.
W77-02858

**CONSERVING WATER BY ANTITRANSPIRANT TREATMENT OF PHREATOPHYTES,**
California Univ., Davis. Water Science and Engineering Section.
For primary bibliographic entry see Field 3B.
W77-02863

**A COMPARATIVE STUDY OF THE EFFECT OF SOIL MOISTURE ON THE GROWTH AND TRANSPIRATION OF CERTAIN POPLAR FORMS, (IN BULGARIAN),**
Forest Research Inst., Sofia (Bulgaria).
For primary bibliographic entry see Field 2I.
W77-02886

## 2E. Streamflow and Runoff

**RESISTANCE EQUATION FOR ALLUVIAL-CHANNEL FLOW,**
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 8B.
W77-02971

**SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 2. BASINS FROM NEW YORK TO DELAWARE.**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02980

**SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME 3. SOUTHERN CENTRAL VALLEY BASINS.**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02981

## 2F. Groundwater

**MARYLAND UPLANDS NATURAL AREAS STUDY. VOL I: EASTERN SHORE,**
Rogers and Golden, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 2L.
W77-02690

**MARYLAND UPLANDS NATURAL AREAS STUDY. VOL II: EASTERN SHORE FIELD NOTEBOOK,**
Rogers and Golden, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 2L.
W77-02691

**FINITE-STATE MODELS OF TRANSPORT PHENOMENA IN HYDROLOGIC SYSTEMS,**
Arizona Univ., Dept. of Hydrology and Water Resources.
M. E. Campana.
Ph.D. Dissertation, 1975. 252 p, 20 fig, 28 tab, 73 ref, 2 append.

Descriptors: *Sediment transport, *Hydrologic systems, *Aquifer systems, *Model studies, Steady flow, Unsteady flow, Texas, Arizona.
Identifiers: *Finite-state models, *Transport models, *Mixing-cell models, Tucson Basin Aquifer, Edwards Limestone Aquifer(Texas).

Two aquifer systems are analyzed using finite-state models (FSMs) which simulate transport phenomena in hydrologic systems. The FSM involves a mixing cell as the basic subdivision but is more flexible than a mixing-cell model in that it can describe more complex systems and is easier to manipulate. The two models are described and compared and distribution functions of the FSM are outlined. A three-dimensional steady-flow FSM is used to account for observed carbon-14 age distribution in a portion of the Tucson Basin Aquifer, without assuming piston flow in the aquifer or evaluating dispersion parameters. This model provides a first approximation of three-dimensional flow distribution, an estimate of long-term average annual recharge, and fluid residence times in the aquifer. A two-dimensional and non-steady flow FSM is used to account for transient tritium distribution in the Edwards Limestone aquifer of south-central Texas. The aquifer is highly anistropic and nonhomogeneous karst, ordinarily difficult to model. The FSM can simultaneously model mass and fluid transport in a hydrologic system, and has the potential for modeling heat transport. (Jahns-Arizona)
W77-02865

**DIGITAL-SIMULATION MODEL OF THE WENONAH-MOUNT LAUREL AQUIFER IN THE COASTAL PLAIN OF NEW JERSEY,**
Geological Survey, Trenton, N. J. Water Resources Div.
B. Nemickas.
Open-file report 75-672, January 1976. 42 p, 20 fig, 3 tab, 28 ref.

Descriptors: *Computer models, *Aquifer characteristics, *Drawdown, *Hydrologic properties, *New Jersey, Coastal plains, Leakage, Groundwater movement, Transmissivity, Aquitards.
Identifiers: *Wenonah-Mount Laurel aquifer(NJ).

A digital computer simulation model of the Wenonah-Mount Laurel aquifer is used to evaluate the aquifer's ability to meet projected future demands and to study the cause of the rapidly declining water levels. The modelled area covers 1,500 square miles of the New Jersey Coastal Plain. All important pumping centers in Monmouth, Burlington, and Ocean Counties are included. The model was calibrated by matching computed declines in the Wenonah-Mount Laurel aquifer historic water-level declines over the 12-year period 1959-70. The results of the modelling show that recharge to the aquifer occurs from the upper confining unit due to pumpage from the aquifer and of equal significance is the effect of water-level declines in the underlying Englishtown aquifer which generate leakage from the Wenonah-Mount Laurel aquifer through the lower confining unit which in turn generates leakage (recharge) to the aquifer from the upper confining unit. The rapid declines of water levels in the Wenonah-Mount Laurel aquifer in the northern part of the New Jersey Coastal Plain are caused by the direct withdrawals from the Wenonah-Mount Laurel aquifer and indirectly from the withdrawals from the underlying Englishtown aquifer. (Woodard-USGS)
W77-02975

**AN APPRAISAL OF GROUND WATER FOR IRRIGATION IN THE APPLETON AREA, WEST-CENTRAL MINNESOTA,**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02982

**WATERLOGGING IN AN ALLUVIAL AQUIFER NEAR LAKE MINNEQUA, PUEBLO, COLORADO,**
Geological Survey, Lakewood, Colo. Water Resources Div.
P. J. Emmons.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 560, Price codes: A06 in paper copy, A01 in microfiche. Water Resources Investigations 76-53, July 1976. 34 p, 6 fig, 4 plates, 4 tab, 12 ref.

Descriptors: *Colorado, *Alluvial aquifers, *Saturated soils, *Surface-groundwater relationships, Aquifers, Hydrogeology, Water storage, Lakes, Reservoirs, Seepage, Water table, Groundwater movement.
Identifiers: *Waterlogging, *Pueblo area(Colo).

The Lake Minnequa area, located immediately south of the Arkansas River near Pueblo, Colo., is mantled with as much as 46 feet (14 meters) of alluvium covering bedrock of Pierre Shale and Niobrara Formation. Surface water enters the area by the Minnequa Canal and the St. Charles Flood Ditch. The water is stored in Lake Minnequa and other reservoirs. Seepage from St. Charles Reservoirs No. 2 and No. 3 is the major source of water to the alluvial aquifer. The depth of the water table ranges from 0 to 40 feet (0 to 12.2 meters). An 0.5-square-mile (1.3-square-kilometer) area im-

mediately south of Lake Minnequa has a water table less than 6 feet (1.8 meters) below land surface. Lake Minnequa is the principal cause of the shallow water table and resulting waterlogged soil. The bedrock hill east of Lake Minnequa and ground-water flow also contribute to the problem. To eliminate the waterlogging problem, the water table would have to be at least 6 feet (1.8 meters) below land surface. Possible alternatives for eliminating the problem include lowering the water level in Lake Minnequa, placing a network of dewatering wells, or constructing a drainage system in the waterlogged area. (Woodard-USGS)
W77-02983

**GROUND-WATER RESOURCES OF WILSON COUNTY, NORTH CAROLINA,**
Geological Survey, Raleigh, N.C. Water Resources Div.
M. D. Winner, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 496, Price codes: A05 in paper copy, A01 in microfiche. Water-Resources Investigations 76-60, June 1976. 85 p, 38 fig, 6 tab, 19 ref.

Descriptors: *Groundwater resources, *Groundwater availability, *Aquifer characteristics, *Water quality, *Water supply, Water yield, Pumping, Drawdown, Groundwater recharge, Groundwater movement, Water level fluctuations, Hydrologic data, Specific capacity, Hydrogeology, Surface-groundwater relationships, Transmissivity, Storage coefficient, Hydraulic conductivity, *North Carolina.
Identifiers: Wilson County(NC).

The most important sources of ground water for Wilson County, North Carolina are (1) the sand beds of the Cretaceous aquifer system in the Coastal Plain section in the eastern part of the county and (2) the bedrock aquifer system in the Piedmont section in the western part of the county. The Cretaceous aquifer is recharged from leakage through overlying beds composed primarily of clay. This leakage rate averages about 67,000 gallons per day per square mile. Present withdrawals from the Cretaceous aquifer average about 740 gallons per day per square mile. Most of the withdrawals from the Cretaceous aquifer are in the Saratoga-Stantonsburg area in eastern Wilson County around which a widespread decline in water level has occurred in the aquifer. Since 1942, the rate of decline has averaged nearly 1.5 feet per year in the center of the pumping area. Availability of water to the bedrock aquifer ranges from about 67,000 gallons per day per square mile in the Coastal Plain section of the county to about 630,000 gallons per day per square mile in the Piedmont section. Present pumpage from the bedrock aquifer in the Piedmont section is estimated to be about 2,300 gallons per square mile. Ground-water quality is generally good in the Cretaceous and bedrock aquifers, except iron concentrations in the water exceed 0.3 milligrams per liter nearly everywhere in the county. (Woodard-USGS)
W77-02984

**DIGITAL GROUND-WATER MODEL OF THE OGALLALA AQUIFER IN PARTS OF WASHINGTON AND YUMA COUNTIES, NORTHERN HIGH PLAINS OF COLORADO,**
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02991

**MAJOR AQUIFERS IN HAND AND HYDE COUNTIES, SOUTH DAKOTA,**
Geological Survey, Huron, S.D. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02992

## 2G. Water In Soils

**DISTRIBUTIONS AND NATURAL LEVELS OF RELATED METALS IN A TROPHIC PATHWAY,**
Allied Chemical Corp., Idaho Falls, Idaho.
For primary bibliographic entry see Field 5B.
W77-02646

**EFFECTS OF SOIL CONSERVATION TREATMENT ON RUNOFF AND SEDIMENT LOSS FROM A CATCHMENT IN SOUTHWESTERN NEW SOUTH WALES, AUSTRALIA,**
Soil Conservation Service of New South Wales, Sydney (Australia). Wagga Research Station.
For primary bibliographic entry see Field 4D.
W77-02772

**STRAIN RATE EFFECT ON THE STRENGTH OF FROZEN SILT,**
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 8D.
W77-02804

**A METHOD FOR THE DETERMINATION OF MERCURY IN SEDIMENTS BY THE AUTOMATED COLD VAPOR ATOMIC ABSORPTION TECHNIQUE AFTER DIGESTION,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02811

**LANDSCAPE GEOCHEMISTRY AND ENVIRONMENTAL PROBLEMS,**
Brock Univ., St. Catharines (Ontario). Dept. of Geological Sciences.
For primary bibliographic entry see Field 5A.
W77-02849

**STRUCTURAL COMPOSITION AND SOME PROBLEMS OF THE WATER REGIME OF DARK-CHESTNUT SOILS OF THE KUSTANAI OBLAST IN CONNECTION WITH THE DURATION OF THEIR CULTIVATION, (IN RUSSIAN),**
A. A. Naumenko.
Izv Akad Nauk Kaz SSR Ser Biol 13(3), p 45-49, 1975.

Descriptors: *Soil structure, *Soil moisture, *Soil physical properties, *Cultivated lands, Arable land, Evaporation, Moisture availability, Wheat, Soil-water-plant relationships.
Identifiers: Kustanai, Oblast, Kazakh SSR, USSR.

The structural composition of the dark-chestnut soils in the Kustanai Oblast, Kazakh, SSR (USSR), that had been cultivated for different times (virgin soils and plowland sown to spring wheat for 3 and 13 yr) was studied. With long cultivation the macrostructure of the arable horizon breaks down and turns to dust, leading to a deterioration of the moisture supply of wheat due to evaporation from the soil.--Copyright 1976, Biological Abstracts, Inc.
W77-02853

**DISTRIBUTION OF WATER AND IONS IN SOILS IRRIGATED AND FERTILIZED FROM A TRICKLE SOURCE,**
Agricultural Research Organization, Bet Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
For primary bibliographic entry see Field 3F.
W77-02855

**CONSUMPTION USE AND WATER REQUIREMENT OF DWARF WHEAT IN LIGHT TEXTURE SOILS OF RAJASTHAN,**
S. K. N. Coll. of Agriculture, Jobner (India).
For primary bibliographic entry see Field 3F.
W77-02860

**TRICKLE-DRIP IRRIGATION: PRINCIPLES AND APPLICATION TO WATER MANAGEMENT IN TROPICAL SOILS,**
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W77-02868

**EFFECT OF GROUNDWATER MOISTURE ON THE FORMATION OF THE SANDY SOILS OF THE KET-TYM REGION OF THE OB RIVER, (IN RUSSIAN),**
Moscow State Univ. (USSR). Dept. of Soil Geography.
E. D. Nikitin.
Biol Nauki (Mosc) 18(5), p 117-121, 1975.

Descriptors: *Groundwater, *Soil moisture, *Sands, *Podzols, *Surface-groundwater relationships, Soil profiles, Soil texture, Soil horizons, Hydrologic properties, Rock properties.
Identifiers: Ket, Tym, Ob river, USSR.

Data from a study of the sandy podzolic soils in the central taiga region of the Ket and Tym tributaries of the Ob River (USSR) are presented, showing that groundwater moisture has a diverse effect on the formation of the podzolic profile of the sandy soils depending to a considerable extent on the material and texture of the sands. A distinct relation was established between the thickness of the podzolic horizon of the soils and the depth of ground waters and composition of the arenaceous parent rocks. The considerable effect of the composition of the arenaceous parent rocks on the formation of hydromorphic podzols must be considered in the classification and in the economic development of sandy soils.
W77-02885

**STUDIES ON SOIL CONSISTENCY: I. COMPREHENSIVE INVESTIGATIONS OF THE CONSISTENCY, (IN JAPANESE),**
Y. Sato, and Y. Yumura.
Bull Tokaikinki Natl Agric Exp Stn 28, p 1-23, 1975.

Descriptors: *Soils, *Soil tests, *Soil properties, *Soil moisture, *Soil physical properties, *Cohesive soils, Soil structure, Shrinkage, Shear strength, Soil density, Humus, Plasticity index.
Identifiers: *Soil consistency, Red-Yellow soils, Clay soils, Red soils.

Soils (27) derived from various parent materials were tested and the properties comprised by the term consistency determined. The mutual relationships among these properties and the relationships between consistency and other general properties of soils were examined. The soils of small moisture retention capacity tended to have small shrinkage limit, large shrinkage ratio and large volume weight. Cohesion in most red-yellow soils was very strong near the moisture level where soil color changes from dark to light, and weakened by further drying. The soils of clay content generally exhibited stronger adhesion, except the soils with high humus content and most red soils. A study was made on a numerical standard for evaluating the magnitude of plasticity. Cohesion, granular cohesion, shear strength, shrinkage ratio and plasticity showed highly positive correlations among themselves. The shear strength-moisture content curve and cohesion-moisture content curve were similar in shape. Expression of the clay content per unit volume markedly increased the coefficient of correlation between the clay content and each property in consistency. The base exchange capacity and the humus content showed

positive correlations with the moisture retention capacity and negative correlations with shrinkage ratio.--Copyright 1976, Biological Abstracts, Inc.
W77-02888

**EFFECT OF IRRIGATION ON SOME PROPERTIES OF SOUTHERN CHERNOZEMS, (IN RUSSIAN),**
Moscow State Univ. (USSR). Dept. of Soil Science.
B. G. Rozanov, A. P. Dzhindil, and M. A. Abdel'Mottalib.
Biol Nauki (MOSC) 18(5), p 111-116, 1975.

Descriptors: *Irrigation effects, *Chernozems, *Soil groups, *Salt balance, *Soil chemical properties, Salts, Drainage effects, Humus, Nitrogen, Sodium, Chlorine, Calcium, Carbon, Acidic soils.
Identifiers: Humates, USSR, Biochemical regime(Soils), Carbon/nitrogen ratio(Soils), Acid mobility(Soil), Odessa, Rostov.

The change of the salt and biochemical regime of southern chernozems under the effect of irrigation with inadequate drainage in the Odessa and Rostov areas (USSR) was studied. The content of humus and N in the soils during the 1st years of irrigation had a tendency to increase. As a result the C:N ratio narrowed. With inadequate drainage the content of salt in southern chernozems increases. With an increase of the number of years of irrigation there is a trend to a relative increase of the proportion of Na and Cl ions in the salt composition. This may explain the increase of mobility of humic acids in the soil profile, since with an increase of the content of Na ions in solution, mobile sodium humates are more active then the less mobile Ca salts.--Copyright 1976, Biological Abstracts, Inc.
W77-02889

**QUALITATIVE COMPOSITION OF IRRIGATION WATER AND SUSPENDED LOAD OF THE ORDZHONIKIDZE IRRIGATION SYSTEM, (IN RUSSIAN),**
For primary bibliographic entry see Field 5B.
W77-02890

**THE PRODUCTIVENESS OF LOESS SOILS OF DIFFERENT DEGREES OF EROSION, (IN GERMAN),**
Giessen Univ. (West Germany).
For primary bibliographic entry see Field 3F.
W77-02891

**THE EFFECT OF STAND STRUCTURE ON WATER REGIME OF MOUNTAIN SOILS OF THE CARPATHIANS, (IN RUSSIAN),**
All-Union Research Inst. of Soil Erosion Control, Kursk (USSR).
For primary bibliographic entry see Field 4A.
W77-02923

**THE AERATION CONDITIONS OF SOUTHERN AND CISCAUCASIAN CHERNOZEMS UNDER IRRIGATION, (IN RUSSIAN),**
Moscow State Univ. (USSR). Dept. of General Soil Sciences.
N. G. Zborishchuk.
Vestn Mosk Univ Ser VI Biol Pochvoved 30(4), p 95-101, 1975.

Descriptors: *Aeration, *Irrigation, *Soil groups, *Chernozems, Crops.
Identifiers: Ciscaucasian area(USSR), Eggplant, USSR, *Soil aeration.

The soil aeration of the ciscaucasian chernozems (USSR) deteriorated to a large extent, particularly during the 1st few years of irrigation; that of the southern chernozems remains unchanged. The effectiveness of the aerationpores in a given period of time is denoted by a common index, the 02 C02 ratio, which depends upon the physical conditions of the soil and themicrobiological and biochemical processes taking place in it. An attempt was made to group the soils according to their aeration conditions. (Various crops including eggplant are discussed.) --Copyright 1976, Biological Abstracts, Inc.
W77-02927

**DETERMINATION OF THE CRITICAL DEPTH FOR BAGAEVSKO-SADKI IRRIGATION SYSTEM, (IN RUSSIAN),**
Moscow State Univ. (USSR). General Soil Sciences.
For primary bibliographic entry see Field 3F.
W77-02928

**PHYSICAL AND CHEMICAL PROPERTIES OF TAKYR SOILS AND CHANGES IN THEIR AGROCHEMICAL PROPERTIES AFTER IRRIGATION, (IN RUSSIAN),**
For primary bibliographic entry see Field 3F.
W77-02929

**ANNUAL DYNAMICS OF SOLUBLE SALTS IN THE SOILS OF AN IRRIGATED FIELD WITH BOTH DEEP CLOSED AND OPEN DRAINAGE AT THE BAGAEVSKO-SADKOVSKAYA IRRIGATION SYSTEM, (IN RUSSIAN),**
Moscow State Univ. (USSR). General Soil Sciences.
For primary bibliographic entry see Field 3F.
W77-02930

**EXTENSIVE OVERBURDEN POTENTIALS FOR SOIL AND WATER QUALITY,**
West Virginia Univ., Morgantown. Div. of Plant Sciences.
For primary bibliographic entry see Field 5B.
W77-03008

**A HYDRAULICALLY DRIVEN SOIL AUGER FOR SAMPLING FINE-TEXTURED AND WET SOILS,**
South Dakota State Univ., Brookings. Remote Sensing Inst.
B. H. Byrnes.
Soil Science Society of America Proceedings, Vol. 39, No. 1, p 156, January-February 1975. 1 fig, 1 ref.

Descriptors: *Soil tests, Soil investigations, Soils, Equipment.
Identifiers: *Soil sampling, *Soil augers.

A core-type bucket auger was modified to fit the drive bar of a hydraulic soil probe with a rotor head. This auger satisfactorily samples claypan, fine-textured and moderately fine-textured soils in a wet condition. The auger system can readily be used alternately with tube core samplers. (Skogerboe-Colo St)
W77-03063

**SOIL WATER EXTRACTION BY ALFALFA,**
North Dakota State Univ., Fargo. Dept. of Soils.
For primary bibliographic entry see Field 3C.
W77-03064

**A DEVICE FOR ISOLATING FIELD SOIL COLUMNS WITH MINIMUM DISTURBANCE,**
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
K. W. Brown.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1008-1009, November-December 1975. 2 fig, 2 ref.

Descriptors: *Soil investigations, Lysimeters, *Soil tests, Instrumetation, Measurement, Equipment, Fabrication.
Identifiers: *Soil columns.

A device is described which can be used to dig a ditch to isolate soil blocks in the field. The ditch can be as deep as 1.5 m with a width of 2.5 cm thus minimizing the amount of soil disturbance in individual blocks. The necessary equipment can be fabricated in a well equipped shop with a minimum of expense. (Skogerboe-Colo St)
W77-03065

**MINIMAL LEACHING WITH VARYING ROOT DEPTHS OF ALFALFA,**
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3C.
W77-03066

**A COMPACTION APPARATUS FOR THE PREPARATION OF SOIL CORES OF DIFFERENT BULK DENSITIES AND THICKNESSES,**
Mississippi State Univ., Mississippi State. Dept. of Agronomy.
V. C. Baligar, V. E. Nash, and F. L. Shuman, Jr.
Soil Science Society of America Proceedings, Vol. 39, No. 5, p 1002-1003, September-October 1975. 2 fig, 1 tab, 7 ref.

Descriptors: *Bulk density, *Moisture tension, Root development, *Soil tests, Soil investigations, Laboratory equipment, Laboratory tests, Instrumentation.
Identifiers: *Soil cores.

An apparatus is described that enables one to prepare soil cores with a desirable bulk density and having different thicknesses for use in soil compaction and plant growth studies. (Skogerboe-Colo St)
W77-03067

**A TECHNIQUE FOR INSTALLING INDUCTION COILS IN A PROFILE WITH MINIMUM SOIL DISTURBANCE,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
J. W. Spotts, and K. W. Brown.
Soil Science Society of America Proceedings, Vol. 39, No. 5, p 1006-1007, September-October 1975. 4 fig.

Descriptors: *Soil mechanics, *Soil investigations, *Soil tests, Soil properties, Soil engineering.

Details of a technique are given which can be used to position induction coils in an undisturbed soil profile to study the shrinking and swelling within the soil profile with changing moisture content. The specially designed apparatus consists of a soil cutting blade which can be advanced horizontally from an access hole into the soil at the desired depth. The induction coils are installed in the slots after the holes have been cut. Installations have been made successfully at depths as great as 2 m. (Skogerboe-Colo St)
W77-03069

**EFFECT OF TEMPERATURE ON DENITRIFICATION RATE IN SOILS,**
Instytut Uprawy Nowozenia i Gleboznawstwa, Szczecin (Poland).
G. Stanford, S. Dzienia, and R. A. Vander Pol.
Soil Science Society of America Proceedings, Vol. 39, No. 5, p 867-870, September-October 1975. 3 fig, 1 tab, 12 ref.

Descriptors: *Denitrification, *Temperature, Soils, *Soil investigations, Organic matter, Soil chemistry, Nitrogen, Nutrients.
Identifiers: *Temperature coefficient(Denitrification).

The effect of temperature on denitrification rate was studied with nine soils differing widely in organic matter content and chemical and physical

characteristics. In the range of 15 to 35C, the temperature coefficient of denitrification, Q10, was approximately 2. Denitrification rates at 35 and 45C were similar. Between 10 and 5C, denitrification rate declined abruptly. The lower limit of the temperature range conforming to a Q10 of 2 was estimated to be 11C. In this study of water-logged soils sealed from the atmosphere, denitrification appeared to obey first-order kinetics. (Skogerboe-Colo St)
W77-03070

**EFFECT OF METHOD OF NITROGEN APPLICATION ON CORN (ZEA MAYS L.) GROWN ON IRRIGATED SANDY SOIL,**
Nebraska Univ., Concord. Northeast Station.
For primary bibliographic entry see Field 3F.
W77-03071

**FERTILIZER OR SALT LEACHING AS AFFECTED BY SURFACE SHAPING AND PLACEMENT OF FERTILIZER AND IRRIGATION WATER,**
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W77-03072

**CHANGES IN THE PHYSICAL PROPERTIES OF SOIL CLAYS DUE TO PRECIPITATED ALUMINUM AND IRON HYDROXIDES: I. SWELLING AND AGGREGATE STABILITY AFTER DRYING,**
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
S. A. El-Swaify, and W. W. Emerson.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1056-1063, November-December 1975. 5 fig, 4 tab, 25 ref.

Descriptors: Soils, *Soil physical properties, Soil investigations, *Aluminum, *Iron oxides, Soil chemistry, Soil chemical properties, *Clays, Aggregate, Illite, Kaolinite.
Identifiers: Soil swelling, Soil drying.

Compressed discs of an illite, a kaolinite, and a mixture of the two were formed from freeze-dried dispersed suspensions of the clays, into which one level of Fe(OH)3 and two levels of Al(OH)3 had been precipitated. The precipitated Fe was found to consist of particles about 40A in diameter and amorphous to X-ray, rather than the acicular goethite that precipitates under similar conditions in the absence of clay. It was deduced from N2 and water vapor sorption measurements that the precipitated Al was presented as very thin layers on the surface of the clay particles, which in the case of the illite could bridge some of the particles. Their form was generally indeterminate, in contrast to the well-crystallized bayerite formed in the absence of clay. All three hydroxy treatments inhibited the double-layer swelling of the Na-illite and Na-Kaolinite/illite mixture in dilute NaCl solutions. Both on weight percent and on an equimolar basis, Al was more effective than Fe in reducing the slaking of dry clay discs and in increasing the resistance of clay to dispersion in pyrophosphate solutions. (Skogerboe-Colo St)
W77-03073

**SUPERSATURATION PHENOMENA AND THE FORMATION OF FLUORAPATITE IN AQUEOUS SUSPENSIONS OF PHOSPHATE ROCK,**
Washington Univ., St. Louis, Mo.
S. H. Chien, D. R. Wier, and C. A. Black.
Soil Science Society of America Proceedings, Vol. 39, No. 1, p 43-47, January-February 1975. 1 fig, 4 tab, 14 ref.

Descriptors: *Acids, *Rocks, Rock properties, Soil investigations, *Supersaturation, Soil chemistry.
Identifiers: *Fluorapatite, *Phosphate rocks.

Dilute HC1 solutions equilibrated with Florida phosphate rock and Tennessee brown phosphate rock in the presence of solid fluorite developed a condition of supersaturation with respect to fluorapatite at 25C. In suspensions boiled before equilibration at 25C, however, the solutions were in equilibrium with fluorapatite, as evidenced by ion-activity products for fluorapatite in the solutions. (Skogerboe-Colo St)
W77-03074

**YIELD RESPONSE OF ALFALFA CULTIVARS AND CLONES TO SEVERAL PH LEVELS IN TATUM SUBSOIL,**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W77-03075

## 2H. Lakes

**SEASONAL VARIATIONS IN CONCENTRATIONS OF NITRATE AND TOTAL PHOSPHORUS, AND CALCULATED NUTRIENT LOADING FOR SIX LAKES IN WESTERN NEW YORK,**
State Univ. of New York at Buffalo. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-02588

**PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME I: PROJECT REPORT,**
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5C.
W77-02616

**PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME II: PROCEDURES AND SELECTED FIELD DATA,**
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5C.
W77-02617

**ECOLOGICAL MODELING AND ESTIMATION OF STRESS,**
Rensselaer Polytechnic Inst., Troy, N.Y. Fresh Water Inst.
For primary bibliographic entry see Field 5C.
W77-02622

**A STATEMENT OF CONCERNS AND SUGGESTED ECOLOGICAL RESEARCH, REPORT NUMBER 1 OF THE LAKE MICHIGAN COOLING WATER STUDIES PANEL.**
Lake Michigan Cooling Water Studies Panel, Chicago, Ill.
For primary bibliographic entry see Field 5C.
W77-02636

**AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX.**
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 2L.
W77-02671

**LAKE ST. CLAIR BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE,**
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
R. N. Kelley.
NOAA Technical Report ERL 372-GLERL 13, May 1976. 16 p, 1 fig, 5 tab, 1 ref. Also as GLERL Contribution No. 74.

Descriptors: *Water levels, *Water level fluctuations, Lakes, Data analysis, Charts, *Michigan.
Identifiers: *Lake St. Clair(Mich).

Lake St. Clair water level gage data are used to determine beginning-of-month water levels and monthly rates of storage change for the years 1910 through 1975 for scientific and planning purposes. Analysis of the results indicates that additional gages, strategically located, are needed for improved accuracy. Beginning-of-month values are needed for scientific and planning studies in many fields, such as lake hydrology, beach and shore erosion, navigation, hydroelectric power generation, and lake level regulation. Monthly rates of change of lake storage, which are derived from the beginning-of-month levels, are needed in water budget studies involving net basin supplies, groundwater flows and lake evaporation. (NOAA)
W77-02675

**AN ANALYSIS OF GREAT LAKES ICE COVER FROM SATELLITE IMAGERY,**
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2C.
W77-02676

**GREAT LAKES ICE COVER, WINTER 1974-75,**
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2C.
W77-02677

**THE MUDDY RUN PUMPED STORAGE PROJECT: A CASE HISTORY,**
Ichthyological Associates, Inc., Drumore, Pa.
For primary bibliographic entry see Field 5C.
W77-02709

**LETHAL AND PREFERRED TEMPERATURES OF THE ALEWIFE (ALOSA PSEUDOHARENGUS) IN LAKE MICHIGAN,**
Industrial BIO-TEST Lab., Inc., Northbrook, Ill.
For primary bibliographic entry see Field 5C.
W77-02710

**CHANGES IN FISH SPECIES COMPOSITION IN THE AU SABLE RIVER, MICHIGAN FROM THE 1920'S TO 1972,**
Institute for Fisheries Research, Ann Arbor, Mich.
For primary bibliographic entry see Field 5C.
W77-02712

**THE SMITH MOUNTAIN - LEESVILLE PROJECT: A CASE HISTORY,**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-02715

**THE ECOLOGY OF AN ARTIFICIAL COOLING LAKE,**
For primary bibliographic entry see Field 5C.
W77-02723

**PLANKTON INVESTIGATIONS NEAR FLEVO POWER STATION,**
For primary bibliographic entry see Field 5C.
W77-02726

**MACROZOOBENTHIC SPECIES ASSEMBLAGES OF SOUTHEASTERN LAKE MICHIGAN, U.S.A.,**
S. C. Mozley, and M. H. Winnell.
Verhandlungen Internationale Vereinlgung fur Theoretische und Ungewandte Limnologie, Vol. 19, p. 922-931, October, 1975. 1 tab., 8 fig., 6 ref.

Descriptors: Shallow water, Habitats, *Benthos, *Benthic faunal, *Zooplankton, *Seasonal, *Temperature, Environmental effects, *Variability, *Aquatic populations, *Biological communities, *Sediments, Depth, Aquatic animals, Fluctuations, Animal populations, Aquatic environment, *Lake Michigan.

Benthic macroinvertebrates from a shallow inshore area of Lake Michigan were described in terms of species composition and seasonal or year-to-year variations as part of preoperational investigations near a nuclear power plant. Major changes in zoobenthic species composition, lifespan and abundance, and magnitude of seasonal fluctuations were related to increasing depth. The approximate lower limit of epilimnetic temperatures in summer was at the conceptual boundary of 16 m and was only slightly deeper than the shallowest occurrence of noticeable amounts of silt-sized particles in the sediments. Much of the seasonal and year-to-year variation was due to small Chironomidea and Naididae. Rapid increases in early summer occurred soon after spring warming and phytoplankton blooms. (Katz)
W77-02728

**SUCCESSIONS OF THE VEGETATION COVER ON THE DRYING BOTTOM OF LAKE SEVAN, (IN RUSSIAN),**
Akademiya Nauk Armyanskoi SSR, Erevan. Institut Geologicheskikh Nauk.
R. O. Geodakyan.
Biol Zh Arm 28(4), p 62-67, 1975.

Descriptors: *Vegetation establishment, *Ecotypes, *Emerging vegetation stage, *Speciation, *Dry beds, Lake stages, Lake beds, Succession.
Identifiers: Armenian-SSR, *Lake Sevan, USSR.

In connection with a drop in the level of Lake Sevan (Armenian SSR(USSR)) about 210 km2 of its bottom has been freed of water. Observations were carried out in 1969, 1970 and 1973 on the southwestern shore, where the width of the dry strip is 1210-1850 m. The purpose was to determine the direction of development of the vegetation cover and rate of its change. The habitat changes of the plants in the dry shore strip are giving rise to a succession from hydro- and hygrophilic species to mesophilic species.--Copyright 1976, Biological Abstracts, Inc.
W77-02736

**PLANKTON PHOTOSYNTHESIS AND DEGRADATION IN THE KAPCHAGAI RESERVOIR IN THE THIRD YEAR OF ITS EXISTENCE, (IN RUSSIAN),**
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. of Microbiology and Virology.
For primary bibliographic entry see Field 5C.
W77-02737

**LEVELS OF ARSENIC AND SELENIUM IN THE GREAT LAKES REGION,**
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 5A.
W77-02751

**ASBESTIFORM FIBRE LEVELS IN LAKES SUPERIOR AND HURON,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W77-02753

**THE EFFECT OF AGRICULTURE ON THE SURROUNDINGS OF LAKE BALATON,**
University of Agriculture, Keszthely (Hungary).
For primary bibliographic entry see Field 5B.
W77-02776

**CIRCULATION, DIFFUSION AND FRONTAL DYNAMICS IN THE COASTAL ZONE,**
Woods Hole Oceanographic Institution, Mass.
G. T. Csanady.
Journal of Great Lakes Research, Vol. 1, No. 1, p 18-32, October 1975. 8 fig, 7 ref. NOAA 03-5-022-26.

Descriptors: *Great Lakes, *Lake Ontario, *On-site investigations, *Circulation, Water circulation, Diffusion, Currents(Water), Flow, *Coasts, Jets, Velocity, Distribution patterns, Boundary layers.

A status report on coastal boundary layer research in the Great Lakes is given. The 'first order' or longshore flow is now understood in terms of the conceptual models of coastal jets, Kelvin waves, and topographic waves. Secondary flow perpendicular to shore ('cross-flow' for short) is less well understood, although its understanding is crucial for a parametrization of the mass exchange between coastal zone and midlake. Various contributions to cross-flow were discussed, and their importance in the mass exchange process estimated. (Humphreys-ISWS)
W77-02794

**A SIMPLE DISPERSION MODEL OF THE MEAN CONCENTRATION FIELD IN THE WESTERN AND CENTRAL BASINS OF LAKE ERIE,**
Canada Centre for Inland Waters, Burlington (Ontario).
P. F. Hamblin.
Journal of Great Lakes Research, Vol 1, No 1, p 92-100, October 1975. 6 fig, 10 ref.

Descriptors: *Great Lakes, *Lake Erie, *Model studies, *Dispersion, Lakes, Mathematical models, Theoretical analysis, Equations, Diffusion, Flow, Circulation, Chlorides, Distribution patterns, Potential flow.
Identifiers: Concentration gradient.

A method of determining horizontal eddy diffusivities appropriate to scales of motion lying at the upper limit of those present in large lakes was based on the comparison of a set of simple solutions of the advection diffusion equation to the mean concentration field of a soluble material. Two features of the annually averaged distribution of the chloride ion in the western and central basins of Lake Erie, namely the sharp gradient of concentration in the vicinity of Pelee Island and the broad plume in the eastern half of the central basin, are best accounted for by a horizontal eddy diffusivity of 3,000,000 sq cm/s. The influence on the dispersal of a dissolved substance by a two-dimensional obstacle placed upstream from a steady source was described and used to account for the concentration gradient occurring between the central and the eastern basins. (Humphreys-ISWS)
W77-02795

**OBSERVATIONS OF THE KELVIN-HELMHOLTZ INSTABILITY IN LABORATORY MODELS AND FIELD EXAMPLES OF THERMAL PLUMES,**
Old Dominion Univ., Norfolk, Va. School of Engineering.
J. M. Kuhlman, and J. M. Prahl.
Journal of Great Lakes Research, Vol 1, No 1, p 101-115, October 1975. 9 fig, 21 ref.

Descriptors: *Lake Erie, *Lakes, *Laboratory tests, *Jets, *Model studies, Buoyancy, Hydraulic models, Heated water, Stability, Water temperature, Temperature, Velocity, Distribution patterns, On-site tests, Vortices, Aerial photography, Ohio.
Identifiers: *Cuyahoga River(Ohio), *Thermal plumes, Densimetric Froude number.

Buoyant, rectangular thermal plumes were modeled in a 2 by 7 meter laboratory water table facility. The plume entered at right angles to a constant temperature, uniform crossflow of depth equal to that of the plume. Highly buoyant plumes (0.16 less than Fr less than 2) were investigated. Fr is densimetric Froude number. Velocity, temperature, and dye measurements were made using a scanning infrared camera, thermistors, dye injection, and a temperature-compensated hot film anemometer. A Kelvin-Helmholtz instability was observed in the plume thermocline for Fr less than 0.50. For the same values of Fr, a cold water wedge penetrated beneath the plume into the plume discharge channel. A series of transverse line vortices quickly grew in the thermocline to cover the vertical extent of the plume, moving nearly with a mean flow. These vortices were visible both by dye injection into the thermocline and surface infrared imagery. Local gradient Richardson (Ri) numbers fell below 1/4 in the thermocline for all plumes observed (Fr less than 1), but above Fr = 0.50, the Kelvin-Helmholtz instability was dominated by randomized turbulent mixing. This vortex instability was also observed in aerial infrared photographs taken by NASA of the Cuyahoga River mouth entering Lake Erie. Field measurements indicated that Ri is less than 1/4 in the thermocline at the river mouth. (Humphreys-ISWS)
W77-02796

**RECONSTRUCTION OF SOME OF THE EARLY STORM SURGES ON THE GREAT LAKES,**
Department of the Environment, Ottawa (Ontario). Ocean and Aquatic Affairs.
T. S. Murty, and R. J. Polavarapu.
Journal of Great Lakes Research, Vol 1, No 1, p 116-129, October 1975. 10 fig, 3 tab, 20 ref, 1 append.

Descriptors: *Great Lakes, *Surges, *Water level fluctuations, *Lake Erie, Water levels, On-site data collections, Analytical techniques, Storms, Weather patterns, Meteorological data.

Some early (pre-World War II) storm surges on the Great Lakes which produced storms that were extensive enough to influence the whole Great Lakes system were reconstructed making use of scant meteorological and oceanographic data and descriptions from popular literature. Port Colborne, on the northeastern shore of Lake Erie, exhibited consistently great storm surges. Negative surges were observed in narrow connecting waters such as the Detroit River. The simple analytical techniques used showed that the water level changes could be accounted for mostly by the large-scale pressure system. An appendix briefly described some of the analytical formulae that were used. It should be made clear that the choice of the parameters for these analytical formulae is rather uncertain, and the accuracy of the estimate is + or - 0.5 feet. Hence, the reconstruction was not attempted for surges with amplitudes less than one foot. (Humphreys-ISWS)
W77-02797

**NITROGEN IN SEDIMENTED ORGANIC MATTER FROM LAKE ONTARIO,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W77-02815

**EVALUATION OF THE PHYTOPLANKTON BIOMASS IN LAKES OF THE WORLD, (IN RUSSIAN),**
Belorussian State Univ., Minsk (USSR).
T. M. Mikheeva.
Gidrobiol Zh 11(3), p 90-104, 1975.

Descriptors: *Phytoplankton, *Biomass, *Lakes.
Identifiers: Belorussian-SSR, *USSR.

Data are presented on the calculated phytoplankton biomass in about 300 lakes of the world, of which 2/3 are located in the USSR (40% of these in the Belorussian SSR). In a number of cases of errors in the method used are revealed. The phytoplankton in a negligibly small part of the world's lakes have been covered by quantitative investigations.--Copyright 1976, Biological Abstracts, Inc.
W77-02816

**LAKE WHITEFISH (CORREGONUS CLUPEAFORMIS (MITCHILL) IN SOUTHERN INDIAN LAKE, MANITOBA,**
Fisheries and Marine Service, Winnepeg (Manitoba).
H. A. Ayles.
Canada Fisheries and Marine Service Technical Report No. 640, 1976. 34 p. 3 fig., 9 tab., 41 ref.

Descriptors: *Baseline studies, *Fish populations, *Canada, Commercial fishing, Food habits, Growth stages, Fish reproduction, Spawning, Mortality, Size, Age, Fish eggs.
Identifiers: *Southern Indian Lake(Manitoba), *Whitefish, Coregonus clupeaformis.

The spawning and population characteristics of lake Whitefish, from Southern Indian Lake, Manitoba, were investigated as part of an effort to establish baseline data prior to the completion of a major hydroelectric development in the region. Whitefish spawn in October or November over areas of large boulders or broken rocks in depths of 1 to 7 meters. Low temperature appeared to trigger the spawning act. The average spawning age for both males and females was 8.8 years, with an average egg count of 28,600. Growth and condition were good for lake whitefish in most regions of the lake, though whitefish from South Bay did not appear to grow as quickly. Different year class strengths were suggested by variation in mean age, weight, and length between whitefish sampled in 1974 versus those sampled in 1972. Principal food items were amphipods, sphaeriids, gastropods and chironomid larvae. Mortality rates varied from 0.43 to 0.70. The flow of the Churchill River through Southern Indian Lake has a strong positive influence on its productivity, resulting in a significant commercial whitefish fishery. Commercial fishing of whitefish has yielded an average of 400,000 kilograms per year since 1942. (Luedtke-Wisconsin)
W77-02821

**TEMPORAL VARIATIONS IN THE PHOSPHORUS CONTENT OF A NORTHERN DYSTROPHIC LAKE,**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 5C.
W77-02824

**TROPHIC CLASSIFICATION OF LAKES USING LANDSAT-1 (ERTS-1) MULTISPECTRAL SCANNER DATA,**
Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W77-02825

**CORROSION OF SELECTED MATERIALS IN LAKE MEAD WATER,**
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 8G.
W77-02832

**AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX,**
Louisiana Wildlife and Fisheries Commission, New Orleans, Div of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 5C.
W77-02879

**STUDY OF PERIPHYTON PRODUCTIVITY IN THE NOVOSIBIRSK RESERVOIR, (IN RUSSIAN),**
Akademiya Nauk SSSR, Novosibirsk. Central Siberian Botanical Garden.
For primary bibliographic entry see Field 5C.
W77-02915

**CHARACTERISTICS OF THE DISTRIBUTION OF MOLLUSKS OF THE FAMILY UNIONIDAE IN THE KREMENCHUG RESERVOIR, (IN RUSSIAN),**
Akademiya Nauk URSR, Kiev. Instutut Zoologii.
V. V. Ivantsiv.
Vestn Zool 6, p 82-84, 1975.

Descriptors: *Mollusks, *Distribution, Reservoirs, Benthos, Biomass.
Identifiers: Anodonta-cygnea, Anodonta-minima, Anodonta-piscinalis, Anodonta-ponderosa, Anodonta-subcircularis, Anodonta-zellensis, Pseudanodonta-complanata, Pseudanodonta-elongata, Ukrainian-Ssr, Unio-longirostris, Unio-ovalis, Unio-pictorum, Unio-tumidus, *Unionidae, USSR, *Kremenchug Reservoir(USSR).

In the macrobenthos of the Kremenchug Reservoir (Ukrainian SSR, USSR), 12 unionid species were found: Anodonta piscinalis, A. subcircularis, A. cygnea, A. ponderosa, A. minima, A. zellensis, Pseudanodonta elongata, P. complanata, Unio tumidus, U. pictorum, U. ovalis and U. longirostris. The distribution of the unionids in this reservoir was essentially dependent on hydrological and hydrochemical conditions. The numbers, biomass and species variety of unionids were greatest in the upper part of the reservoir, and lowest in the lower part, where studies were conducted primarily in a deepwater arm.--Copyright 1976, Biological Abstracts, Inc.
W77-02921

**STRATIGRAPHY AND HISTORY OF DEVELOPMENT OF THE VOITOVTSOVSK BOG IN THE VINNITSA OBLAST, (IN UKRAINIAN),**
Akademiya Nauk URSR, Kiev. Instytut Botaniki.
A. I. Kuz'mychov, and T. L. Andriyenko.
Ukr Bot Zh 32(6), p 774-778, 1975.

Descriptors: *Stratigraphy, *Bogs, History, Peat.
Identifiers: Balneology, Ukrainian-Ssr, USSR, Voitovtsovsk Bog, *Vinnitsa Oblast(USSR).

A thorough description is presented of an unique bog in the Ukraine (Ukrainian SSR, USSR). The plant cover of the Voitovtsovskoe bog, its geomorphology, peat species and the structure of the peat accumulation are considered. The history of the bog's development is traced from its stratigraphy. The significance of the bog for balneological purposes due to the chemical composition of the peat is discussed.--Copyright 1976, Biological Abstracts, Inc.
W77-02922

**EFFECTS OF FLOOD FLOWS ON WATER QUALITY OF TIOGA-HAMMOND LAKES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02931

**BIOLOGICALLY ACTIVE SUBSTANCES OF THE SILT DEPOSITS OF DNIEPER RESERVOIRS, (IN RUSSIAN),**
Akademiya Nauk URSR, Kiev. Instytyt Hidrobiologii.
For primary bibliographic entry see Field 5B.
W77-02934

**FALLS LAKE WATER-QUALITY STUDY; HYDRAULIC LABORATORY INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02941

**A VARIATIONAL APPROACH TO NONLINEAR WAVE THEORY,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02942

**ESTIMATION OF WINDS OVER THE GREAT LAKES,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. T. Resio, and C. L. Vincent.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD/A-028 022, Price codes: A04 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-12, June 1976. 71 p, 29 fig, 3 tab, 37 ref, append.

Descriptors: *Wind velocity, *Great Lakes, Estimating, Lakes.

Past efforts to estimate wind speeds over a large lake have met with very limited success. The purpose of this study is to demonstrate that, with a combined theoretical-empirical approach, winds over a lake can be obtained from transformed wind speeds at nearby land stations. The theoretical results provide a basis for comparison of many empirical data sets and establish a rational means of analyzing the expected differences between winds over land and those over a marine surface. This in turn affords a means of examining systematic variations in the ratio of wind speeds over a lake to wind speeds over land. The good agreement theory and observation indicates that wind estimates over the lake can be made for a wide range of synoptic conditions with an rms error of under 5 knots. The theoretical curve for the lake wind/land ratio provides a stable estimate of lake winds well beyond wind speeds for which there is good empirical data. Consequently, the technique presented here offers relatively good relatively good accuracy even in extreme wind conditions where there are little or no direct measurements of winds over the lake. (WES)
W77-02944

**TIOGA OUTLET WORKS, TIOGA AND HAMMOND LAKES, SUSQUEHANNA RIVER BASIN, PENNSYLVANIA; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02956

**STRATIFIED FLOW IN GREAT SALT LAKE CULVERT,**
Geological Survey, Salt Lake City, Utah. Water Resources Div.
For primary bibliographic entry see Field 8B.
W77-02987

**LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION; APPLICATION OF THREE-DIMENSIONAL**

**HYDRODYNAMIC MODEL TO STUDY EFFECTS OF PROPOSED JETPORT ISLAND ON THERMOCLINE STRUCTURE IN LAKE ERIE,**
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Earth Sciences.
J. F. Paul, and W. J. Lick.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-022 588, Price codes: A05 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Contract Report H-75-1, March 1976 (Report 17-6, Report 6 of a series). 82 p, 52 fig, 25 ref.

Descriptors: *Airports, *Hydraulic models, *Lake Erie, *Numerical analysis, *Thermocline, Feasibility studies, Model studies, *Ohio.
Identifiers: Cleveland area(Ohio).

A previously developed three-dimensional, variable-density hydrodynamic model was applied to the Lake Erie area about Cleveland. This application was to investigate the effect of a proposed jetport island on the summer stratification pattern in the nearshore lake area and on the flushing characteristics of the Cuyahoga River outflow into the lake. Initial results obtained from the application of the model are presented. (WES)
W77-02994

**THE DISTRIBUTION AND ABUNDANCE OF LARVAL FISHES ALONG THE WESTERN SHORE OF LAKE ERIE AT MONROE, MICHIGAN,**
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
D. D. Nelson, and R. A. Cole.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 207, Price codes: A04 in paper copy, A01 in microfiche. Institute of Water Research, Michigan State University, Technical Report No. MSU-IWR-TR-75-0032.4, October 1975. 66 p, 2 tab, 9 fig, 37 ref.

Descriptors: *Fish, *Freshwater fish, *Thermal powerplant, *Michigan, *Lake Erie, *Cooling waters, *Heated water, Coldwater fish, Fry, *Electric power, Water pollution sources, Yellow perch, Carp, White bass.
Identifiers: Larval fish, Western Lake Erie, Monroe(Mich), Gizzard shad, *Alewife, Freshwater drum.

The distribution and abundance of larval fish in and around the condenser cooling-water system of an electric generating station on western Lake Erie was studied during the summers of 1973 and 1974. Samples were collected with a 1m, number 0 mesh (0.571 mm) plankton net. Analysis of variance and Tukey's post-hoc comparisons were used to analyze differences in numbers of individuals collected. During the study period, 20 species of taxonomic groups were identified although 90% of the total catch was represented by only 4 taxa. Abundances from year to year within these most abundant groups varied greatly, indicating a need for more than short-term studies. (Katz)
W77-03011

**TEMPERATURE TOLERANCE OF YOUNG-OF-THE-YEAR LAKE WHITEFISH, COREGONUS CLUPEAFORMIS,**
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
For primary bibliographic entry see Field 5C.
W77-03024

**MOVEMENT OF YELLOW PERCH (PERCA FLAVESCENS) AND WHITE SUCKER (CATOSTOMUS COMMERSONI) IN A NEARSHORE GREAT LAKES HABITAT SUBJECT TO A THERMAL DISCHARGE,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W77-03027

**A LAKEWIDE STUDY OF PHYTOPLANKTON BIOMASS AND ITS SPECIES COMPOSITION IN LAKE ERIE, APRIL-DECEMBER 1970,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W77-03039

**THE EFFECT OF THE DISCHARGE OF THERMAL EFFLUENT FROM A POWER STATION ON THE PRIMARY PRODUCTIVITY OF AN EPIPHYTIC ALGAL COMMUNITY,**
Alberta Univ., Edmonton. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-03046

**DISTRIBUTION OF FISH SPECIES IN GREAT BEAR LAKE, NORTHWEST TERRITORIES, WITH REFERENCE TO ZOOPLANKTON, BENTHIC INVERTEBRATES, AND ENVIRONMENTAL CONDITIONS,**
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5C.
W77-03055

**RECOVERY OF POLLUTED LAKES; A SWEDISH RESEARCH PROGRAM ON THE EFFECTS OF ADVANCED WASTEWATER TREATMENT AND SEWAGE DIVERSION: 7. DIFFUSE MUNICIPAL POLLUTION: EXAMPLES FROM THE TOWNS OF MOTALA AND UPPSALA, (IN SWEDISH),**
Uppsala Kommun Naturvardsverkets RR-Undersokning (Sweden). Algtestlab. Fysiol. Bot.
For primary bibliographic entry see Field 5D.
W77-03057

## 2I. Water In Plants

**INFLUENCE OF SAND IN REDDS ON SURVIVAL AND EMERGENCE OF BROOK TROUT (SALVELINUS FONTINALIS),**
Wisconsin Cooperative Fishery Unit, Stevens Point.
D. A. Hausle, and D. W. Coble.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 57-63, 1976, 3 fig., 4 tab., 26 ref.

Descriptors: *Brook trout, *Reproduction, *Fish eggs, *Hatching, *Immature growth stage, *Fry, *Sands, *Spawning, Environmental effects, *Artificial substrates, Trout, Fish reproduction, Laboratory tests, Life cycles, Dissolved oxygen, Methodology, Mortality, Fish management.
Identifiers: Survival, *Artificial redds.

Alevins of brook trout (Salvelinus fontinalis) were buried in laboratory troughs in spawning gravel containing 0 to 25% sand. Sand slowed emergence and reduced the number of fry emerging. Weight of fry was not related to proportion of sand in the gravel, but was related to time; the fry were heaviest near the time of peak emergence, and lighter before and after the peak. Survival was estimated to be 84% from egg deposition to hatching for brook trout in Lawrence Creek, Wisconsin, and 70% from hatching to emergence, providing a total estimate for survival from egg deposition to emergence of 59%. (Katz)
W77-02711

**A SEQUENTIAL APPROACH TO THE COUNTING OF PLANKTON ORGANISMS,**
Pavia Univ. (Italy).
For primary bibliographic entry see Field 7B.
W77-02721

**COMPARATIVE MORPHOLOGICAL AND ECOPHYSIOLOGICAL ASPECTS OF TWO SCLEROPHYLLOUS CHILEAN SHRUBS,**
Universidad Catolica de Chile, Santiago. Laboratorio de Botanica; and Universidad Catolica de Chile, Santiago. Inst. of Biological Sciences.
For primary bibliographic entry see Field 3B.
W77-02858

**ANOMALOUS WATER RELATIONS IN COPPER-DEFICIENT WHEAT PLANTS,**
Waite Agricultural Research Inst., Glen Osmond (Australia). Dept. of Agronomy.
R. D. Graham.
Australian Journal of Plant Physiology, Vol. 3, No. 2, p 229-236, March, 1976. 2 fig, 3 tab, 17 ref.

Descriptors: *Wheat, *Leaves, *Wilting, *Wilting point, *Water loss, *Moisture availability, Resistance, Copper, Moisture deficit, Water utilization, Water yield, Root systems, Root development, Soil water, Soil moisture, Soil-water-plant relationships, Stomata, Moisture, Moisture content, Drying.
Identifiers: *Copper deficiency(Plants), *Leaf water potential, *Diffusive resistance(Plants).

Wilting is perhaps the most widely observed symptom of copper deficiency in cereals. Experiments were conducted to investigate the way in which copper deficiency affected the water relations of wheat plants, and to test the hypothesis that the low root-shoot ratio of copper deficient plants resulted in low plant water potentials, and thus wilting. Leaf water potential, diffusive resistance, relative water content, weekly water use, yields and head bending were measured on wheat plants subjected to four copper levels and two water levels, and the results presented. Severe copper deficiency resulted in no grain yield, wilting, and increased leaf diffusive resistance. Water supply effects were observed but there was no interaction between copper and water treatments. Mild copper deficiency resulted in small yield decreases. It is concluded that wilting, characteristic of copper-deficient plants, is due to structural weakness and not to the water stress of the plants; also, increased leaf diffusive resistance is due to a specific effect of copper deficiency on guard cells and not to decreased leaf water potential. (Jamail-Arizona)
W77-02861

**A COMPARATIVE STUDY OF THE EFFECT OF SOIL MOISTURE ON THE GROWTH AND TRANSPIRATION OF CERTAIN POPLAR FORMS, (IN BULGARIAN),**
Forest Research Inst., Sofia (Bulgaria).
T. Naydenova-Yaneva.
Gorsko Stop Nauka. 11(5), p 42-52, 1974.

Descriptors: *Soil moisture, *Transpiration, *Plant growth, *Trees, Soil types, Forest soils, Brown soils, Alluvium.
Identifiers: Poplars, Populus euramericana, Populus weltheimeipappel.

Glasshouse experiments were carried out with 4 poplar forms: Populus euramericana I-214, P. euramericana I-262, P. euramericana I-455 and P. weltheimeipappel on 2 soil types: alluvial and brown forest (dark) at a permanent soil moisture content of 100, 85, 70, 55, 40 and 25% of its maximum water-holding capacity. The amount of water transpired by a single sapling during the experiment, as well as that per gram of increment, was higher if the soil moisture ranged 70-100% of the maximum water-holding capacity, and the least at 40-25%. The optimal moisture content or the moisture content at which the highest increment of a vegetative mass was obtained for the poplar forms varied at 70-85%. If soil moisture was increased or decreased, the increment decreased, being the least at moisture content of 40 and 25%. P. euramericana I-214 and P. weltheimeipappel showed almost similar growth on alluvial soils,

having a moisture content of 100 and 85%; the best growth was that of P. euramericana I-214 at a moisture content ranged 40-55%. On brown forest soils P. euramericana I-262 showed good growth at a range of soil moisture of 40-100%, but at a soil moisture of 25% it had the lowest growth as compared with the other poplar forms.--Copyright 1975, Biological Abstracts, Inc.
W77-02886

**THE ECOLOGY OF CADDIS FLIES (TRICHOPTERA) FROM MOUNTAIN STREAMS OF SOUTHERN TIEN-SHAN (EXEMPLIFIED BY THE FAUNA OF THE AK-BURA RIVER), (IN RUSSIAN),**
Oshskii Gosudarstvennyi Pedagogicheskii Institut (USSR).
E. O. Omorov.
Entomol Obozr 54(4), p 773-779, 1975.

Descriptors: *Caddis flies, Aquatic insects, Invertebrates, Larvae, *Ecology, Benthic fauna, Rivers, Streams.
Identifiers: Ak-Bura, Apatania-copiosa, Arctopsyche-sp, Dinarthrum-reductum, Himalopsyche-gigantea, Himalopsyche-hoplura, Hydropsyche-gracilis, Hydropsyche-sp, Rhyacophilia-obscura, Rhyacophila-praebranchiata, Tadzhik-Ssr, Tien-Shan, USSR.

Caddis fly larvae and pupae were collected in the Ak-Bura river (the Altai ridge) (Tadzhik SSR, USSR); the list of species is given. The greatest specific variety was observed in the middle and upper current zones. According to the specific composition of caddisflies the zones can be grouped as follows: an upper current zone is characterized by the abundance of Himalopsyche gigantea, H. hoplura larva and Rhyacophila praebranchiata larvae; a middle current zone is characterized by the prevalence of R. obscura, Arctopsyche sp., Dinarthrum reductum, Aptania copiosa, etc.; in the lower current zone the most abundant are Hydropsyche gracilis and Hydropsyche sp.--Copyright 1976, Biological Abstracts, Inc.
W77-02892

**AMINO ACID AND FRACTIONAL COMPOSITION OF PROTEIN OF THE VEGETATIVE MASS OF CORN AT DIFFERENT LEVELS OF MINERAL NUTRITION AND WATER SUPPLY, (IN RUSSIAN),**
Vsesoyuznyi Nauchno-Issledovatelskii Institut Kormov, Moscow (USSR).
F. V. Voronkova, V. S. Titov, E. S. Vorob'ev, and B. B. Okonskii.
S-Kh Biol 10(6), p 841-848, 1975.

Descriptors: *Amino acids, *Proteins, *Corn(Field), *Nutrients, Water supply, Mineralogy, *Nitrogen.
Identifiers: Albumin, Globulin, Glutelin, Prolamin, Silage.

Sowing dates, water availability and mineral nutrition affect the biological value of crude protein in corn. With acute water deficit the redistribution of N-containing substances between corn stems and leaves affected the utilization of amino acids and the digestibility of nutrients of the silage. In newly-cut corn from unirrigated plots the amount of albumin in stems approached their content in leaves; there were more globulins, proalamins and glutelins in stems than in leaves. The quantitative amino acid composition of protein fractions in corn in irrigated plots was different from that of non-irrigated plots.--Copyright 1976, Biological Abstracts, Inc.
W77-02918

**CARBOHYDRATES AND NITROGENEOUS COMPOUNDS IN A NUMBER OF HIGHER AQUATIC PLANTS AND DYNAMICS OF THEIR CONTENT DURING VEGETATION, (IN RUSSIAN),**
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
K. B. Yakubovskii, and A. I. Merekhko.
Gidrobiol Zh 11(6), p 81-84, 1975.

Descriptors: *Carbohydrates, *Nitrogen compounds, Aquatic plants, Vegetation, *Proteins, Amino acids.
Identifiers: Alisma-plantago, Butomus-umbellatus, Phragmites-communis, Polygonum-amphibium, Potamogeton-perfoliatus, Scirpus-lacustris, Typha-angustifolia.

Data are presented on the content of nitrogeneous substances (crude protein), carbohydrates and free amino acids in narrowleaf cattail (Typha angustifolia), common reed (Phragmites communis), flowering-rush (Butomus umbellatus), water plantain (Alisma plantago), bulrush (Scirpus lacustris), perfoliate pondweed (Potamogeton perfoliatus) and willow-grass (Polygonum amphibium). The content of carbohydrates and nitrogenous compounds in the plants was variable during vegetation in the individual species. In early Aug. the qualiative and quantiative composition of free amino acids depended on the plant species. In general the content of amino acids was high. Harvesting of these aquatic plants should be done before their flowering, since they have high fodder value at this period.--Copyright 1976, Biological Abstracts, Inc.
W77-02919

**THE DEVELOPMENT OF SCIENTIFIC BASES AND A TECHNOLOGY OF PRODUCTION IN POND FISH BREEDING, (IN RUSSIAN),**
Moskovskaya Selskokhozyaistvennaya Akademiya (USSR).
F. G. Martyshev, Yu. A. Privezentsev, V. V. Lavrovskii, I. M. Anisimova, and Yu. V. Kudryashova.
Isv Timiryazev S-Kh Akad 1, p 138-144, 1976.

Descriptors: Carp, Fisheries, Ponds, Fish hatcheries, Reservoirs, Technology, Trout, Cisco.
Identifiers: Breeding, Coregonus-peled, Crucian carp, Goldfish, Salmo-irideus.

The investigations of the department and laboratory of pond fish culture for the last 5 yr took 2 main directions: improving stock growing technology and increasing the specific composition of pond fish (Salmo irideus, Coregonus peled, carp, Crucian carp, goldfish) in reservoirs.--Copyright 1976, Biological Abstracts, Inc.
W77-02924

**EFFECT OF MUSKRATS ON AQUATIC VEGETATION, (IN RUSSIAN),**
V. A. Chashchukhin.
Byull Mosk O-Va Ispyt Prir Otd Biol 80(6), p 21-29, 1975.

Descriptors: *Muskrats, *Vegetation, *Europe.
Identifiers: Eurasia, Reed, *USSR.

The introduction of muskrats into Eurasian bodies of water disturbed the existing biocenotic relationships in many localities. The removal of reeds and other plant species, a reduction of aquatic macrophyte thickets and the resulting decrease in muskrat abundance were observed in several regions of the USSR and in some countries of W Europe.--Copyright 1976, Biological Abstracts, Inc.
W77-02925

**METABOLISM OF PROTEIN AND NUCLEIC ACIDS DURING ADAPTATION TO VARIOUS TYPES OF DROUGHT, (IN RUSSIAN),**
Vsesoyuznyi Institut Rastenievodstva, Leningrad (USSR).
For primary bibliographic entry see Field 3F.
W77-02926

**BIOTRANSFORMATION AND CHEMICAL FORM OF MERCURY IN PLANTS,**
Environmental Montoring and Support Lab., Las Vegas, Nev.
For primary bibliographic entry see Field 5C.
W77-03006

**THE GROWTH AND YIELD OF POPLAR CULTURES UNDER WATERING AND FERTILIZATION CONDITIONS, (IN BULGARIAN),**
Research Station of Rapid-Growth Tree Species, Svistov (Bulgaria).
For primary bibliographic entry see Field 3F.
W77-03040

**CALCULATION OF RATE OF NUTRIENT UPTAKE BY GROWING ROOTS,**
National Fertilizer Development Center, Muscle Shoals, Ala.
F. E. Khasawneh.
Agronomy Journal, Vol. 67, No. 4, p 574-576, July-August 1975. 21 equ, 7 ref.

Descriptors: *Root development, *Root systems, *Nutrients, *Nutrient removal, *Fertilizers, Mathematical analysis, Crop response.
Identifiers: *Root aging, *Root growth.

Equations are presently available to calculate the rate of nutrient uptake by growing roots. They can be used to estimate an average rate of uptake by the entire root system, but they fail to give specific information on uptake by a unit segment of root or on the effects of aging and morphological changes of such a segment on its capacity for uptake. A theoretical analysis is presented of the process of nutrient uptake by a growing root system. The objective of this analysis is to derive equations that would give such specific information. A frequency distribution function is used to partition root systems into a continuum of age groups, each possessing a rate of uptake that is a function of the age of that group. Equations are derived that utilize time-series measurements of root length and nutrient accumulation in the plant. These derivations are used to calculate parameters of nutrient uptake related to two properties of the root system: (1) the rate of nutrient uptake of a unit segment of root and the manner by which this rate changes with aging and (2) the rate of nutrient flux into the entire root system as a function of time. (Skogerboe-Colo St)
W77-03061

## 2J. Erosion and Sedimentation

**SEBASTIAN INLET. GLOSSARY OF INLETS REPORT NO. 3,**
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
For primary bibliographic entry see Field 2L.
W77-02673

**DELAWARE'S CHANGING SHORELINE,**
Delaware Univ., Newark. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-02684

**EFFECTS OF MAN ON THE INTERFACE OF THE HYDROLOGICAL CYCLE WITH THE PHYSICAL ENVIRONMENT.**
For primary bibliographic entry see Field 4D.
W77-02771

**THE EROSION INDEX AS A FACTOR FOR DETERMINING TURBIDITY IN RIVERS (L'INDICE D'EROSION-FACTEUR DE DETERMINATION DE LA TURBIDITE DES RIVIERES),**
R. Papasov.

In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 15-20, 1974. 3 fig, 1 tab, 6 ref.

Descriptors: *Turbidity, *Rivers, *Sediment discharge, *Foreign countries, *Streams, Soil classification, Cultivation, Graphical methods, Watersheds(Basins), Rainfall intensity, Erosion, Slopes, Soil physical properties, Vegetation effects, Agriculture, Soil types.
Identifiers: *Stream turbidity, *Bulgaria, Erosion index.

In determining the average annual sediment discharge P kg/s, the average annual stream turbidity rho g/cu m, and the sediment modulus q sub p g/s/sq km, in rivers, the erosion index epsilon kg/s and the soil characteristic X were used. These two factors quantitatively describe the erosion process in catchments and the influence of different soils upon them. The erosion index was defined mainly by the characteristics of the catchment, the rainfall intensity (mm/min), the slope gradient i, vegetation, and the degree to which soil is plowed p. The rainfall intensity plays an important role in determining the erosion index. Different soil types and cultivation also affect the erosion index. The influence on the erosion process of human activity by soil cultivation and exploitation of pasture and woodland is evident and was also considered in the investigation. Empirical formulae were obtained, and nomographs were devised for simple and rapid evaluation of the erosion index, sediment discharge, and turbidity in rivers. (See also W77-02771) (Froehlich-ISWS)
W77-02773

**PLANT COVER AND SEDIMENT TRANSPORTATION IN THE RIVER BASIN OF THE SEINE (LA COUVERTURE VEGETALE ET LES DEBITS SOLIDES DES COURS D'EAU DANS LE BASSIN DE LA SEINE),**
J. Tixeront.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 28-35, 1974. 1 fig, 4 tab, 12 ref.

Descriptors: *Sediment discharge, *Rivers, *Foreign countries, *Vegetation effects, Watersheds(Basins), Suspended load, Sediment transport, Sediment yield, Forests, Cropland, Arable land, On-site data collections.
Identifiers: *France, *Paris, *Marne River, *Seine River.

The basin of the Seine has been the site of a remarkable evolution of plant cover since the mid-nineteenth century: (1) the forested area or area covered by herbaceous vegetation has increased, and (2) the area of arable land has decreased by about 40%. As the volume of suspended material in the rivers originates essentially from arable land, it could be expected that there would be a decrease in the quantity of suspended material. One can compare the sedimentation measurements performed during the years 1864, 65, and 66 on the Seine and the Marne upstream from Paris with the values observed today. Such a comparison seems to give a significant correlation with the decrease of arable land. The future developments that are likely to happen as a result of current trends are: (1) a cessation of the expansion of forested areas; (2) the return to cultivation of areas in Champagne, France, that had been forested between 1850 and 1950; and (3) the increase in size of the cultivated areas as a result of new trends in land distribution. (See also W77-02771) (Humphreys-ISWS)
W77-02775

**EROSION PHENOMENA IN DRAINAGE BASINS REFLECTED BY SEDIMENT FLOW IN RIVERS (PHENOMENES D'EROSION DES BASSINS VERSANTS REFLETES PAR LES TRANSPORTS SOLIDES DES COURS D'EAU),**
Institutul de Meteorologie si Hidrologie, Bucharest (Rumania).
C. Diaconu.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 57-61, 1974. 3 fig, 1 tab, 10 ref.

Descriptors: *Watersheds(Basins), *Sediment yield, *Erosion, *Rivers, Foreign countries, Sediment discharge, Vegetation effects, Sediment load, Sediment distribution, Sediment transport, Sheet erosion, Soil erosion.
Identifiers: *Romania.

The long-term mean values of the sediment discharges, their territorial distribution, the laws of their variation with altitudes, as well as the characteristics of sediment discharges conditioned by the water flow were defined as the main characteristic elements of the sediment flow in rivers which themselves show the state of erosion in a basin. The connection existing between these characteristic elements and the state of erosion in basins was analyzed, emphasizing the great degree of complexity in the reflection of the erosion phenomena in a basin on the sediment movement in rivers through the transition state when the river beds act as temporary deposition sites for sediment in movement from the erosion site on the upland to the ocean. A method of determining the possible maximum values of the specific mean sediment flow on the basis of the state of erosion in basins was given. The growing need for research on methodological aspects of this topic was mentioned. (See also W77-02771) (Humphreys-ISWS)
W77-02780

**THE EFFECT OF AFFORESTATION ON EROSION PROCESSES AND SEDIMENT YIELD,**
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 4C.
W77-02781

**APPROACHES TO CONTROLLING EROSION IN RURAL AREAS,**
Strathclyde Univ., Glasgow (Scotland). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W77-02782

**WATER EROSION AND SEDIMENT DISCHARGE,**
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. V. Karaushev, I. V. Bogaliubova, and N. N. Bobrovitskaya.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 73-77, 1974. 1 fig, 1 tab, 8 ref.

Descriptors: *Erosion, *Watersheds(Basins), *Rural areas, *On-site investigations, *Europe, On-site data collections, Sediment discharge, Land use, Soil erosion, Runoff, Soils, Podzols, Sediment load, Sediment yield.
Identifiers: *USSR.

The principles of research into water erosion were considered; interrelationships between the processes of erosion from the slopes of drainage basins and sediment discharge from river basins were given, both on the basis of general theoretical principles as well as with regard to topography, man's activities, etc. A simplified theoretic model of surface wash from slopes was proposed; the model takes into account the extent and type of the overland flow. Design rules were given, based on morphometric parameters of the stream network. A method for approximately quantifying slope erosion produced by spring snow melting or single storms was given. Data on soil wash resulting from spring snowmelt floods are generalized according to observations made at water balance stations and small watersheds (125 station years) in the areas of accelerated (anthropomorphic) water erosion in the central part of the European territory of the USSR. Graphs and tables were given which characterize the quantity of soil wash from different soil types and different agricultural practices as a function of runoff depth during spring snowmelt floods. (See also W77-02771) (Humphreys-ISWS)
W77-02783

**PREDICTING SEDIMENT YIELD FREQUENCY FOR RURAL BASINS TO DETERMINE MAN'S EFFECT ON LONG-TERM SEDIMENTATION,**
Agricultural Research Service, Temple, Tex.
For primary bibliographic entry see Field 4D.
W77-02786

**SOIL COVER GOVERNS SOIL LOSS ON UNITED STATES CLAYPAN SOILS,**
Agricultural Research Service, Columbia, Mo. North Central Region Watershed Research Center.
For primary bibliographic entry see Field 4D.
W77-02787

**SUSPENDED SEDIMENTS FROM URBAN DEVELOPMENT,**
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02788

**URBANIZATION AND THE PROCESSES OF EROSION AND SEDIMENTATION IN THE RIVER NILE,**
Ain Shams Univ., Cairo (Egypt). Dept. of Engineering.
For primary bibliographic entry see Field 4C.
W77-02789

**INCREASE OF SEDIMENT TRANSPORT DUE TO LARGE-SCALE URBANIZATION,**
National Research Centre for Disaster Prevention, Tokyo (Japan).
For primary bibliographic entry see Field 4C.
W77-02790

**EFFECT OF THE GROWTH OF THE WEST PART OF MEXICO CITY ON HYDRODYNAMIC PROCESSES (EFFET DE LA CROISSANCE DE LA PARTIE OUEST DE LA VILLE DE MEXICO SUR LES PROCESSUS HYDRODYNAMIQUES),**
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Geografia.
For primary bibliographic entry see Field 4C.
W77-02791

**SUSPENDED SEDIMENT PRODUCTION AND BUILDING ACTIVITY IN A SMALL BRITISH BASIN,**
Exeter Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 4C.
W77-02792

**EFFECT OF LAND DEVELOPMENT ON SOIL EROSION AND SEDIMENT CONCENTRATION IN AN URBANIZING BASIN,**
Parsons, Brinckerhoff, Quade and Douglas, Inc., New York.
For primary bibliographic entry see Field 4C.

W77-02793

**A METHOD FOR THE DETERMINATION OF MERCURY IN SEDIMENTS BY THE AUTOMATED COLD VAPOR ATOMIC ABSORPTION TECHNIQUE AFTER DIGESTION,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02811

**A NOTE ON EFFICACY OF VEGETATIVE COVERS AND SLOPES ON RUNOFF AND FERTILITY LOSSES IN A SEMI-ARID TRACT OF RAJASTHAN,**
S. K. N. Coll. of Agriculture, Jobner (India).
For primary bibliographic entry see Field 4D.
W77-02856

**FINITE-STATE MODELS OF TRANSPORT PHENOMENA IN HYDROLOGIC SYSTEMS,**
Arizona Univ., Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2F.
W77-02865

**STUDY AND EVALUATION OF REMEDIAL SAND BYPASSING PROCEDURES,**
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 2L.
W77-02933

**BIOLOGICALLY ACTIVE SUBSTANCES OF THE SILT DEPOSITS OF DNIEPER RESERVOIRS, (IN RUSSIAN),**
Akademiya Nauk URSR, Kiev. Instytyt Hidrobiologii.
For primary bibliographic entry see Field 5B.
W77-02934

**USE OF AUTOMATED REMOTE SENSING TECHNIQUES TO DEFINE THE MOVEMENT OF TOW-GENERATED SUSPENDED MATERIAL PLUMES ON THE ILLINOIS AND UPPER MISSISSIPPI RIVERS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
L. E. Link, Jr, and A. N. Williamson, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-025 733, Price codes: A04 in paper copy, A01 in microfiche. Technical Report M-76-6, June 1976. 56 p, 7 fig, 6 tab, 13 plates, 9 ref, append.

Descriptors: *Aerial photography, *Illinois River, *Infrared radiation, *Mississippi River, *Optical properties, *Plumes, *Remote sensing, *Suspended load, *Sedimentation, *Water sampling.

Sequential color-infrared aerial photos and corresponding surface water samples were obtained at selected sites on the Illinois and Upper Mississippi Rivers to examine the movement of tow-generated suspended material plumes. The aerial photos were digitized with a scanning microdensitometer, and optical density values were extracted for correlation with suspended material concentration data obtained by laboratory analysis of the water samples. The poor correlation between optical density and concentration values prevented quantitative definition from the imagery of the distribution of suspended material concentrations at the sites as a function of time. Digital data handling procedures were used to enhance the visibility on the imagery of the tow-generated plumes. The procedures applied were successful in delineating the movement and dissipation of the tow-generated plumes under favorable sun and water conditions. (WES)
W77-02957

**BEACH NOURISHMENT TECHNIQUES; REPORT 1, DREDGING SYSTEMS FOR BEACH NOURISHMENT FROM OFFSHORE SOURCES,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
T. W. Richardson.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-024 983, Price codes: A20 in paper copy, A01 in microfiche. Technical Report H-76-13, September 1976 (Report 1 of a series). 83 p, 46 fig, 1 tab, 1 plate, 86 ref.

Descriptors: *Beaches, *Shores, *Dredging.
Identifiers: *Dredged material, *Beach nourishment.

Results are presented of the first two phases of a research project aimed at developing new dredging systems for beach nourishment from offshore sources. As an introduction to the subject matter, the current situation in the United States regarding beach nourishment and offshore dredging equipment is outlined. Example nourishment projects are described in order to illustrate the types of nourishment projects accomplished and the range of equipment used to date. Next, the engineering considertions involved in selecting an optimum nourishment system for a particular project or project category are presented, and their effects on system characteristics are discussed. The main body of the report presents the results of an investigation into equipment suitable for offshore nourishment work. Approximately 50 examples are described illustrating dredge types, pipelines, connections, and miscellaneous pieces of equipment. The final portion of the report consists of the selection of certain equipment subcategories for further consideration and the construction of possible offshore nourishment systems using this selected quipment. (WES)
W77-02965

**RESISTANCE EQUATION FOR ALLUVIAL-CHANNEL FLOW,**
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 8B.
W77-02971

**FLUME STUDIES WITH FINE AND COARSE SANDS,**
Geological Survey, Lakewood, Colo. Water Resources Div.
C. F. Nordin, Jr.
Open-file report 76-762, September, 1976. 18 p, 5 fig, 3 tab, 11 ref.

Descriptors: *Model studies, *Sediment transport, *Hydraulic properties, *Flumes, Laboratory tests, *Sands, Particle size, Flow rates, Methodology.

This report presents a summary of hydraulic and sediment-transport data for two series of laboratory studies in a recirculating flume. Sands with median diameters of 0.25 and 1.1 millimeters were used in the studies. Velocities and depths were controlled, and the slopes, bed configurations and sediment-transport rates adjusted to the imposed independent variables. Mean depths were varied from about 0.2 to 0.9 meter and mean velocities ranged from about 0.4 to 2.0 meters per second. (Woodard-USGS)
W77-02976

## 2K. Chemical Processes

**PESTICIDE RESIDUE ANALYSIS IN WATER (103.1), TRAINING MANUAL,**
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Program Operations.
For primary bibliographic entry see Field 5A.
W77-02624

**ACID PRECIPITATION,**
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
For primary bibliographic entry see Field 2B.
W77-02800

**APPLICATIONS OF DIRECT AQUEOUS INJECTION GAS CHROMATOGRAPHY AND FREEZE CONCENTRATION FOR THE DETERMINATION OF ORGANIC COMPOUNDS IN WATER AND WASTE WATERS,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02809

**NEW AUTOMATED COLORIMETRIC METHOD FOR THE DETERMINATION OF CHLORIDE USING CHROMOTROPIC ACID,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02812

**HETEROGENEOUS SENSITIZED DECOMPOSITION OF WATER WITH SUNLIGHT,**
Exxon Research and Engineering Co., Linden, N.J.
A. K. Ghosh, and H. P. Maruska.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 172, Price codes: A02 in paper copy, A01 in microfiche. Report No. SNF-RA-N-75-090, September 1975. 22 p. 9 fig., 13 ref. NSF ERP75-13901.

Descriptors: *Hydrates, *Water chemistry, Oxygen, Hydrogen, Light, Electrochemistry, Thin films, Electrolysis, Hydrogen bonding.
Identifiers: *Water decomposition, *Photocatalyst, Copper oxide, Titanium dioxide, Sunlight, Sputtering.

The objective of the project is to demonstrate that an inexpensive heterogeneous photocatalyst may efficiently decompose water to hydrogen and oxygen with sunlight, specifically focusing on sensitization of known photo catalysts to the sunlight spectrum. In the first quarter of the project, a short circuit photocurrent response in the visible with chromium-doped titanium dioxide in an electrochemical cell has been demonstrated. It was also shown that titanium dioxide could be grown electrochemically in an inexpensive manner. Copper oxide was grown by oxidation of copper, and sputtering of copper oxide to make a copper oxide/titanium dioxide heterojunction is being investigated. (Luedtke-Wisconsin)
W77-02819

**RECORDS OF WELLS AND WATER QUALITY FOR THE GARBER-WELLINGTON AQUIFER, NORTHERN OKLAHOMA AND SOUTHERN LOGAN COUNTIES, OKLAHOMA,**
Geological Survey, Oklahoma City, Okla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02974

**A WATER-QUALITY ASSESSMENT OF THE BURNHAM CREEK WATERSHED, POLK COUNTY, MINNESOTA,**
Geological Survey, St. Paul, Minn. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02979

**GROUND-WATER RESOURCES OF WILSON COUNTY, NORTH CAROLINA,**
Geological Survey, Raleigh, N.C. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02984

**WATER-RESOURCES DATA FOR DEEP AQUIFERS ON EASTERN MONTANA,**
Geological Survey, Helena, Mont. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02985

**MAJOR AQUIFERS IN HAND AND HYDE COUNTIES, SOUTH DAKOTA,**
Geological Survey, Huron, S.D. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02992

**CONTENT OF LITHIUM, URANIUM AND THORIUM IN MINERAL SPRINGS OF THE NAKHICHEVAN ASSR, (IN RUSSIAN),**
For primary bibliographic entry see Field 5A.
W77-03016

**EFFECT OF TEMPERATURE ON DENITRIFICATION RATE IN SOILS,**
Instytut Uprawy Nowozenia i Gleboznawstwa, Szczecin (Poland).
For primary bibliographic entry see Field 2G.
W77-03070

**CHANGES IN THE PHYSICAL PROPERTIES OF SOIL CLAYS DUE TO PRECIPITATED ALUMINUM AND IRON HYDROXIDES: I. SWELLING AND AGGREGATE STABILITY AFTER DRYING,**
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
For primary bibliographic entry see Field 2G.
W77-03073

**SUPERSATURATION PHENOMENA AND THE FORMATION OF FLUORAPATITE IN AQUEOUS SUSPENSIONS OF PHOSPHATE ROCK,**
Washington Univ., St. Louis, Mo.
For primary bibliographic entry see Field 2G.
W77-03074

## 2L. Estuaries

**OREGONS'S ESTUARIES,**
Oregon State Univ., Corvallis. Water Resources Research Inst.
K. L. Percy, C. Sutterlin, D. A. Bella, and P. C. Klingeman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 067, Price codes: A12 in paper copy, A01 in microfiche. Oregon's Estuaries, May 1974.

Descriptors: *Estuaries, *Bays, *Inlets(Waterways), *Intertidal areas, Oceans, Rivers, Straits, Streams.
Identifiers: *Oregon, *Oregon estuaries, *Oregon bays, *Hydraulic descriptions Sea Grant Program.

This report provides a summary of much of the known information about Oregon's estuaries. It gives numerous agencies where supporting information can be obtained. This report provides the planner with a 'starting point' for assembling the required data concerning most of the Oregon estuaries. (Author extracted)
W77-02593

**EFFECTS OF CRUDE OIL ON MARINE INVERTEBRATES,**
Texas Univ. Medical Branch at Galveston. Marine Biomedical Inst.
For primary bibliographic entry see Field 5C.
W77-02627

**TRACE HYDROCARBON ANALYSIS: THE NATIONAL BUREAU OF STANDARDS, PRINCE WILLIAM SOUND/NORTHEASTERN GULF OF ALASKA, BASELINE STUDY,**
National Bureau of Standards, Washington, D. C. Analytical Chemistry Div.
For primary bibliographic entry see Field 5A.
W77-02628

**THE MARINE BIOLOGICAL IMPACT OF THE HONOLULU GENERATING STATION,**
Hawaii Univ., Honolulu. Sea Grant Program.
For primary bibliographic entry see Field 5C.
W77-02631

**ADSORPTION OF COPPER AND COBALT FROM FRESH AND MARINE SYSTEMS,**
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5B.
W77-02645

**PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE.**
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 5C.
W77-02660

**STORM TIDE FREQUENCY ANALYSIS FOR THE OPEN COAST OF VIRGINIA, MARYLAND, AND DELAWARE,**
National Weather Service, Silver Spring, Md. Office of Hydrology.
F. P. Ho, R. J. Tracey, and V. A. Meyers.
NOAA Technical Memorandum NWS HYDRO-32, August 1976. 57 p, 23 fig, 7 tab, 42 ref.

Descriptors: *Hurricanes, *Floods, *Hazards, *Coasts, *Storm water, *Virginia, *Maryland, *Delaware, Climatology, Tides, Sea level, Insurance, Storm surge, Frequency analysis.
Identifiers: Storm tides.

Storm tide height frequency distributions are developed on the coast of Virginia, Maryland and Delaware for the National Flood Insurance Program. Storm tides are computed from a full set of climatologically representative hurricanes using the National Weather Service numerical-dynamic storm surge model. Winter storm effects are estimated from tide gage records. Storm tide levels from all storms are shown in coastal profile between annual frequencies of 0.10 and .002. This report is intended for use in estimating actuarial risk to buildings from coastal floods and in flood plain management. (NOAA)
W77-02661

**MARINE POLYCULTURE BASED ON NATURAL FOOD CHAINS AND RECYCLED WASTES,**
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5C.
W77-02662

**THE ARCTIC COASTAL ENVIRONMENT OF ALASKA. VOL. II: A COMPILATION AND REVIEW OF SCIENTIFIC LITERATURE OF THE ARCTIC MARINE ENVIRONMENT,**
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-02665

**HYDRODYNAMIC MODEL OF THE GREAT BAY ESTUARINE SYSTEM,**
New Hampshire Univ., Durham. Mechanics Research Lab.
B. Celikkol, and R. Reichard.
Sea Grant Program Report No. UNH-SG-153, August 1976. 115 p, 9 fig, 1 tab, 21 ref, 12 append. SG-04-5-158-50 (SGR/CZ-2).

Descriptors: *Estuaries, *Hydrodynamics, *Mathematical models, *New Hampshire, Coasts, Estuarine environment, Model studies.
Identifiers: Bottom friction, Eddy viscosity, *Great Bay estuary(NH).

A numerical hydrodynamic model dèveloped by Connor and Wang has been applied to the Great Bay Estuary system. The model, using the finite element method, was found to be better suited to the complexities of the Great Bay Estuary system than Leendertse's finite difference model. Initial model development has been completed, and qualitatively acceptable results are presented. A numerical experiment was conducted to develop a procedure to be used for selction of critical model parameters in the calibration process. The general scheme for model calibration is presented, and is ready to be implemented, pending receipt of current data collected last summer by the National Ocean Survey. (NOAA)
W77-02667

**HISTORY OF OCEAN DUMPING IN THE GULF OF MEXICO,**
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W77-02668

**THE INTERACTION OF WAVES AND OIL SPILL,**
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 5B.
W77-02669

**FORMULAS USED TO ANALYZE WIND-DRIVEN CURRENTS AS FIRST-ORDER AUTOREGRESSIVE PROCESSES,**
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
H. O. Mofield, and D. Mayer.
NOAA Technical Memorandum ERL PMEL-7, August 1976. 24 p, 6 fig, 6 tab, 2 ref.

Descriptors: *Ocean currents, Numerical analysis, *Alaska, *Regression analysis.
Identifiers: Outer Continental Shelf, *Wind driven currents, *Autoregression analysis.

This memorandum justifies formulas used to analyze wind-driven ocean currents as first-order autoregressive processes forced by the wind. A set of numerical experiments with synthetic data shows that the formulas give accurate results with both white and nonwhite noise forcing and with either filtered or non-filtered data. The formulas are a significant improvement over those traditionally used in autoregression analysis based on covariances. (NOAA)
W77-02670

**AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX.**
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
Technical Bulletin No. 19, January 1976. 165 p, 3 maps. PL 88-309, Proj 2-188-R.

Descriptors: *Estuarine environment, Aquatic life, *Baseline studies, Water resources, *Louisiana, *Gulf of Mexico, Lakes, Invertebrates, Zooplankton, Mollusks, Hydrology, Climatology, Sediments.
Identifiers: *Coastal zone, *Lake Pontchartrain(La), *Lake Maurepas(La), Vertebrates.

This study was made to investigate the composition, general distribution, and abundance of commercially or potentially important fauna inhabiting the Lake Pontchartrain-Lake Maurepas estuarine complex, so that comparisons with previously completed wetland research in Louisiana and the northern Gulf of Mexico might enable administrators to efficiently manage Louisiana's renewable coastal zone resources. Vertebrate and macroinvertebrate populations were sampled with a 16-foot trawl and a 100-foot beach seine. Mulluscan benthic communities were empirically determined utilizing a Peterson dredge. Zooplankton was estimated based upon collections accomplished utilizing a no. 2 mesh 1.8x0.5 meter net. Hydrological and climatological parameters were collected at four stations in addition to those coinciding with trawl, seine, Peterson, and zooplankton locations. Grain size determinations were made of the upper three inches of sediment samples during two separate sampling efforts--one in 1972 and another in 1973. (NOAA)
W77-02671

**ECONOMICS OF STORM PROTECTION,**
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 6F.
W77-02672

**SEBASTIAN INLET. GLOSSARY OF INLETS REPORT NO. 3,**
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
A. J. Mehta, W. D. Adams, and C. P. Jones.
Sea Grant Program Report No. 14, August 1976. 55 p, 5 fig, 7 tab, 37 ref. SG-04-3-158-43.

Descriptors: *Florida, *Inlets(Waterways), *Sedimentation, *Sediment transport, Geology, Storms, Dredging, Jetties.
Identifiers: Sebastian Inlet(FL), Morphology.

This report of Sebastian Inlet is one of a 'Glossary of Inlets' series to be prepared under the State University System Sea Grant project, 'Nearshore Circulation, Littoral Drift and the Sand Budget of Florida'. The purpose of this series is to provide for each inlet a summary of the more significant available information and to list known documentation. Sebastian Inlet is a man-made cut connecting the Atlantic Ocean to the Indian River on the east coast of Florida, about 45 miles south of Cape Canaveral. Following a brief note on the geologic setting information is given on its climate and storm history, jetty improvements, dredging, its morphological changes, hydraulics and the sedimentary processes. (NOAA)
W77-02673

**A SHEARED COORDINATE SYSTEM FOR STORM SURGE EQUATIONS OF MOTION WITH A MILDLY CURVED COAST,**
National Weather Service, Silver Spring, Md. Techniques Development Lab.
For primary bibliographic entry see Field 2B.
W77-02674

**ABSTRACTS. SPECIAL SYNPOSIUM - THE MIDDLE ATLANTIC CONTINENTAL SHELF AND NEW YORK BIGHT,**
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5C.
W77-02678

**THE METULA OIL SPILL,**
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5C.
W77-02679

**BISCAYNE BAY AND ITS ENVIRONS. AN ANALYSIS OF ITS PRESENT AND FUTURE USES FOR METROPOLITAN DADE COUNTY,**
General Oceanics, Inc., Miami, Fla.
For primary bibliographic entry see Field 5G.
W77-02680

**SEDIMENT DISPERSAL PATTERNS AS CLUES TO PLACER-LIKE PLATINUM ACCUMULATION IN AND NEAR CHAGVAN BAY, ALASKA,**
Wisconsin Univ., Madison. Marine Research Lab.
For primary bibliographic entry see Field 5B.
W77-02681

**EFFECTS OF BALED SOLID WASTE DISPOSAL IN THE MARINE ENVIRONMENT--A DESCRIPTIVE MODEL,**
New Hampshire Univ., Durham. Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W77-02683

**DELAWARE'S CHANGING SHORELINE,**
Delaware Univ., Newark. Dept. of Geology.
J. C. Kraft, E. A. Allen, D. F. Belknap, C. J. John, and E. M. Maurmeyer.
Delaware Coastal Zone Management Program, Technical Report No. 1, May 1976. 330 p, 177 fig, 2 append.

Descriptors: *Delaware, *Coasts, *Geology, *Sediment transport, *Shore protection, *Subsidence, *Sea level, Beaches, Geomorphology.
Identifiers: *Coastal zone, *Shoreline changes, Shorelines, Eustacy.

The coastal zone of Delaware, including both the coasts of Delaware Bay and the Atlantic shoreline, is categorized as a lagoon-barrier-marsh shoreline. This coastal zone is presently undergoing a relatively rapid transgression by the Atlantic Ocean. This transgression is an effect of coastal erosion caused by the action of waves and high tidal waters. However, in addition longer term geologic factors such as coastal subsidence and sinking of the continental margin apply. Another aspect is that of eustatic, or actual, rise in the level of the world's oceans. A combination of these factors leads to a pervasive erosion and gradual rise of the Atlantic Ocean relative to Delaware's land area. The report details some of the geological processes and summarizes present knowledge of the geology of the area, its sedimentary environments, rates of change and active processes, and presents some predictions of expected change. Consideration of these factors by planners, coastal managers and coastal residents will lead to much less friction in the future regarding unwarranted expenditures of public funds in a manner effective only over the short term, five or ten year period.(NOAA)
W77-02684

**COASTAL ZONE BOUNDARIES.**
Delaware State Planning Office, Dover. Coastal Zone Management Program - Public Involvement. Working Paper No. 2, September 1976. 35 p. 13 fig, 1 tab.

Descriptors: *Delaware, *Management, *Coasts, *Wetland, *Salt marshes, Boundaries(Surfaces), Maps, Tidal marshes, Beaches, *Coastal marshes.
Identifiers: *Coastal zone management, *Uplands, Coastal waters, Territorial sea.

This is the second in a series of working papers which will be issued to interested citizens and governmental officials so that they may actively and effectively participate in the development of Delaware's Coastal Zone Management Program. Regulations implementing the Federal Coastal Zone Management Act specify that the management program show evidence that the State has developed and applied a procedure for identifying the boundary of the coastal zone. Necessary elements of this identification process are included in this working paper. The final Coastal Zone Management Program for Delaware will reflect both regulatory applications due to the coastal relationship of the entire State. Therefore, the entire State is recommended for inclusion in the management program. This area will be the basis for broad program management purposes, primarily coordination, information systems, and basic standards development. This boundary reflects many of the biophysical concerns, especially the drainage basin/watersheds factors, as well as making use of the established intitutional structure offered by a coastal counties approach. (NOAA)
W77-02685

**ASSATOAGUE MARINE SANCTUARY: A CASE STUDY,**
Virginia Inst. of Marine Science Gloucester Point.
For primary bibliographic entry see Field 6G.
W77-02686

**GEOGRAPHIC AREAS OF PARTICULAR CONCERN.**
Delaware State Planning Office, Dover. Coastal Zone Management Program - Public Involvement. Working Paper No 3, September 1976. 20 p.

Descriptors: *Delaware, *Geographical regions, *Land use, *Groundwater, *Coasts, Habitats, Hazards.
Identifiers: Coastal zone management, Coastal processes, Coastal waters, Subaqueous lands.

This is the third in a series of working papers which will be issued to interested citizens and governmental officials so that they may actively and effectively participate in the development of Delaware's Coastal Zone Management Program. It deals only with the process of determining areas and describes the significance of those areas considered and the initial planning steps taken which will load to eventual designation of Geographic Areas of Particular Concern. Subjects treated include: Areas of unique, scarce, fragile or vulnerable natural habitat or feature, historic or archaeological significance, or scenic value; areas of high productivity or essential habitat for living resources, or of critical concern for the production of food, areas of substantial urban use, recreation or economic value, opportunity or concentration; areas subject to significant hazards due to coastal processes, groundwater resources areas; areas of geologic, topographic or morphologic concern for development; and coastal waters and subaqueous lands. (NOAA)
W77-02687

**COASTAL ZONE BOUNDARIES. SUMMARY.**
Delaware State Planning Office, Dover. Coastal Zone Management Program - Public Involvement. Working Paper No 2 (Summary), September 1976. 3 p.

Descriptors: *Delaware, *Management, *Coasts, Wetlands, Salt marshes.
Identifiers: *Coastal zone management, Uplands, Territorial sea, Coastal waters.

This paper summarizes the second in a series of working papers issued to interested citizens and governmental officials so that they may actively participate in the development of Delaware's Coastal Zone Management Program. The summary provides details on the procedure for identifying the seaward and inland boundaries of Delaware's Coastal Zone. Federal lands are identified and recommended management boundaries and the impact of the boundary recommendations are discussed. (NOAA)
W77-02688

**PROBABILISTIC TRAJECTORY ASSESSMENTS FOR OFFSHORE OIL SPILLS IMPACTING LONG ISLAND,**
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5B.
W77-02689

**MARYLAND UPLANDS NATURAL AREAS STUDY. VOL I: EASTERN SHORE,**
Rogers and Golden, Inc., Philadelphia, Pa.
J. Rogers, S. Syz, and F. Golden.
Report to Maryland Department of Natural Resources Coastal Zone Management Program, (1976). 104 p, 18 fig, 5 tab, append.

Descriptors: *Land use, *Natural resources, *Water table, *Coasts, *Maryland, *Wetlands, Assessments, Wildlife, Recreation, Forestry, Fisheries, Runoff, Soils, Vegetation.
Identifiers: *Coastal zone management, *Aquatic buffer zones, *Uplands, Environmental assessments, Coastal aquatic environments.

The Maryland Uplands Natural Areas Study Volume I describes the scope, objectives and methodologies of the natural areas inventory of Maryland's coastal zone. The data parameters used in the inventory as well as the potential users and the uses of the data are discussed. A special effort was made to describe in detail the processes and considerations relating to aquatic buffer zones. It is through the hydrologic processes that upland natural areas are most directly related to coastal aquatic environments. The discussion of buffer zones in this volume provides detail necessary to understand the natural processes in these zones and to allow delineation of aquatic buffer zones. Included is a discussion of the rationale behind the choice of parameters inventoried and the techniques used in the natural areas inventory. A discussion of how areas might be evaluated for specified uses or relative quality is also part of this volume. (See also W77-02691) (NOAA)
W77-02690

**MARYLAND UPLANDS NATURAL AREAS STUDY. VOL II: EASTERN SHORE FIELD NOTEBOOK,**
Rogers and Golden, Inc., Philadelphia, Pa.
J. Rogers, S. Syz, and F. Golden.
Report to Maryland Department of Natural Resources Coastal Zone Management Program, March 1976. 238 p, 15 fig.

Descriptors: *Maryland, *Coasts, *Wetlands, *Land use, Geology, Physiography, Vegetation, Data processing, Management, Resources, Assessments, *Natural resources.
Identifiers: *Aquatic buffer zone, *Coastal Zone management, *Uplands, *Resources assessment.

The report is organized into three sections. First, the study area is described in terms of its geology, physiography, and vegetation communities. Representative cross sections of the different vegetation communities are included. This is followed by a brief overview of the site selection process, the data management system and the parameters and potential uses that were sampled. The remaining portion of the report covers the detailed encoding instruction for filling out the field data forms. These instructions are organized by data card as shown on the sample field data form. The Field Notebook incorporated in this volume represents the methodology developed by the Coastal Zone Management Program for sampling upland natural areas on Maryland's Eastern Shore. The notebook contains a description of the natural history of the shore as well as a description of the methods and techniques for data collection. It is intended to serve as a manual for organizations or individuals who may be interested in carrying out field surveys of upland sites on the Eastern Shore. (See also W77-02690) (NOAA)
W77-02691

**CONCENTRATIONS AND CONCENTRATION FACTORS OF HEAVY METALS IN BROWN ALGAE,**
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 5A.
W77-02698

**TOXICITY OF THE SURGEON FISHES-II PROPERTIES OF THE PRINCIPAL WATER SOLUBLE TOXIN,**
Tohoku Univ., Sendai (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 5C.
W77-02700

**PERSISTENCE OF POLYCHLORINATED BIPHENYLS IN THE HARD-CLAM (MERCENARIA MERCENARIA) AND THE EFFECT UPON THE DISTRIBUTION OF THESE POLLUTANTS IN THE ESTUARINE ENVIRONMENT,**
London Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W77-02703

**LEAD UPTAKE IN TWO MARINE PHYTOPLANKTON ORGANISMS,**
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5C.
W77-02708

**COMPARISON OF 115M CD ACCUMULATION FROM SEDIMENTS AND SEA WATERS BY POLYCHAETE WORMS,**
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
For primary bibliographic entry see Field 5B.
W77-02717

**EDWARDSIELLA TARDA FROM AN EPIZOOTIC OF MULLETS (MUGIL CEPHALUS) IN OKITSU BAY, (IN JAPANESE),**
Kochi Univ. (Japan). Dept. of Cultural Fisheries.
For primary bibliographic entry see Field 5C.
W77-02718

**STUDIES ON THE CHEMICAL BEHAVIOR OF 106-RU IN SEA WATER AND ITS UPTAKE BY MARINE ORGANISMS -I, ACCUMULATION AND EXCRETION OF 106-RU BY CLAM,**
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
For primary bibliographic entry see Field 5C.
W77-02722

**BIOACCUMULATION OF MERCURY IN MYOXOCEPHALUS QUADRICORNIS (L.) (TELEOSTEI, COTTIDAE) IN AN UNPOLLUTED AREA OF THE BALTIC,**
Helsinki Univ. (Finland). Dept. of Environmental Science.
For primary bibliographic entry see Field 5C.
W77-02731

**EFFECTS OF WATER QUALITY ON LARVAL SETTLEMENTS IN LOS ANGELES HARBOR AS DETERMINED BY MULTIVARIATE STATISTICAL TECHNIQUES,**
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W77-02735

**CONTAMINANTS IN THE NEW YORK BIGHT,**
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Program.
For primary bibliographic entry see Field 5B.
W77-02799

**WAVE PROPAGATION DURING THE GHANA UPWELLING,**
Ghana Univ., Legon. Dept. of Physics.
R. W. Houghton, and T. Beer.
Journal of Geophysical Research, Vol. 81, No. 24, p 4423-4429, August 20, 1976. 9 fig, 1 tab, 9 ref.

Descriptors: *Ocean waves, *Upwelling, *Atlantic Ocean, *Africa, Waves(Water), Internal waves, On-site investigations, Continental shelf, Temperature, Water temperature, Salinity, Foreign countries, Currents(Water), Ocean currents, Correlation analysis, Coasts, Oceanography.
Identifiers: *Kelvin waves, *Ghana.

During the coastal upwelling in 1974, the ocean temperature along the coast of Ghana exhibited periodic variations at a frequency of 0.07 cpd which propagated westward along the coast. Equatorial, shelf, and Kelvin waves were discussed in this paper, and it was stated that the 1974 wave could be described in terms of any of these types of waves. However, it was concluded that in the light of current theories of energy exchange in coastal waves, the 1974 oscillation most likely was an internal Kelvin wave. (Sims-ISWS)
W77-02801

**SPATIAL AND TEMPORAL VARIATIONS IN THE INTERSTITIAL WATER CHEMISTRY OF CHESAPEAKE BAY SEDIMENTS,**
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 5C.
W77-02808

**THE EFFECT OF DISSOLVED ORGANIC MATTER IN SEA WATER ON THE UPTAKE OF MIXED INDIVIDUAL HYDROCARBONS AND NUMBER 2 FUEL OIL BY A MARINE FILTER-FEEDING BIVALVE (MERCENARIA MERCENARIA),**
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5C.
W77-02817

**EFFECTS OF PASSAGE THROUGH POWER PLANT COOLING SYSTEMS ON ESTUARINE COPEPODS,**
Maryland Univ., Solomons. Chesapeake Biological Lab.
For primary bibliographic entry see Field 5C.
W77-02820

**THE CAPACITY OF SALT MARSH VEGETATION TO MODIFY THE QUALITY OF ESTUARINE WATERS,**
Rhode Island Univ., Kingston. Dept. of Plant and Soil Science.
R. J. Hull.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 997, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, September 30, 1976. 34 p, 6 fig, 10 tab, 6 ref. OWRT B-062-RI(1). 14-31-0001-4173.

Descriptors: Nitrogen, Phosphorus, Cadmium, Zinc, *Absorption, Eutrophication, Ions, *Heavy metals, *Nutrients, *Salt marshes, *Marsh plants, Estuaries, Estuarine environment, *Pollutant identification, Sediments, Tide waters, Water quality, Water pollution.
Identifiers: Spartina alterniflora, Spartina patens, Marsh grasses, *Salt water cordgrass.

The ability of tidal marsh vegetation to absorb nutrient and heavy metal ions introduced to the marsh by tidal flood waters was investigated. Water soluble salts of N, P, Cd, and Zn were ap-

plied to the marsh surface during low tide, and infiltration into the sediment was measured by analyzing water samples taken from wells placed 15, 30, 60 and 90 cm into the sediment. Ammonium, applied as urea, and phosphate penetrated the marsh sediment readily with most concentrated in the upper 15 to 30 cm. Spartina alterniflora growing on the marsh absorbed approximately 40% of the NH4+ and 20% of the P applied. S. alterniflora and S. patens absorbed NH4+ preferentially from solutions containing 10 to 15% NaC1. S. patens absorbed NH4+ at normal rates regardless of the solution oxygen tension. Cd and Zn applied to the marsh surface was not detected in sediment water and plant uptake was less than 1% of that applied. Radio Cd and Zn was absorbed from nutrient solution by S. alterniflora and moved via symplast and apoplast throughout the plant. Nutrient sink properties of tidal marshes are confirmed.
W77-02830

**NYCTHEMERAL VARIATION OF THE PHYTOPLANKTON IN CAMPECHE BAY, MEXICO, (IN SPANISH),**
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Biologia.
For primary bibliographic entry see Field 5C.
W77-02854

**1976 ENVIRONMENTAL CONDITIONS RELATIVE TO SHRIMP PRODUCTION IN COASTAL LOUISIANA,**
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 5C.
W77-02876

**AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX,**
Louisiana Wildlife and Fisheries Commission, New Orleans, Div of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 5C.
W77-02879

**ROLE OF STOCK BIOMASS AND TEMPERATURE IN RECRUITMENT OF SOUTHERN GULF OF ST. LAWRENCE ATLANTIC COD, GADUS MORHUA,**
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
For primary bibliographic entry see Field 5C.
W77-02883

**BARATARIA BASIN: SALINITY CHANGES AND OYSTER DISTRIBUTION,**
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 5C.
W77-02884

**DISTINCTIVE FEATURES OF SELF-PURIFICATION OF WATER AND SEDIMENTS OF A SHALLOW SEA AS EXEMPLIFIED BY THE SEA OF AZOV, (IN RUSSIAN),**
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
For primary bibliographic entry see Field 5G.
W77-02897

**STUDY OF A RELATIONSHIP BETWEEN CHEMICAL AND BACTERIOLOGICAL POLLUTION IN THE COASTAL ZONES, (IN FRENCH),**
CEA Centre de Pierrelatte (France).
For primary bibliographic entry see Field 5A.
W77-02903

**YEASTS AND FUNGI IN MARINE ENVIRONMENTS, (IN FRENCH),**
Centre Hospitalo-Universitaire-Poitiers (France). Lab. of Bacteriology.
For primary bibliographic entry see Field 5B.
W77-02904

**DISTRIBUTION OF AMPHIPODA IN THE DNIESTER ESTUARY AND ITS POSSIBLE CHANGES IN CONNECTION WITH THE REGULATION OF THE DNIESTER RIVER, (IN RUSSIAN),**
Institute of Biology of the Southern Seas, Sevastopol (USSR).
For primary bibliographic entry see Field 5C.
W77-02914

**ON THE LIVING ENVIRONMENT FOR FISH IN THE COASTAL WATERS SURROUNDING THE NEW AND OLD VOLCANIC ISLAND 'NISI-NOSIMA', (IN JAPANESE),**
Tokyo Univ. of Fisheries (Japan). Lab. of Research and Training Vessel Shinyo-maru.
For primary bibliographic entry see Field 5C.
W77-02917

**STUDY AND EVALUATION OF REMEDIAL SAND BYPASSING PROCEDURES,**
Scripps Institution of Oceanography, La Jolla, Calif.
R. W. Harris, D. L. Inman, J. A. Bailard, and R. L. Oda.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 480, Price codes: A07 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Contract Report H-76-1, May 1976. 128 p, 65 fig, 18 ref.

Descriptors: *Littoral drift, *Sediment transport, Sand waves, *Sands.

The purpose of this program was to investigate and develop a practical method for the management of sand influenced by littoral transport. The work covered laboratory research, field investigations, and tests. Initially, laboratory investigations of jet pumps, crater-sinks, and fluidization were conducted utilizing specially designed apparatus. During the laboratory investigations a new principle of fluidization was developed. This new form of fluidization is called 'duct-flow' fluidization. Field tests of craters dredged on the ocean floor showed that wave action causes the crater to elongate in a direction parallel to the wave crests. Later, the jet pump and fluidization apparatus were operated individually in the field. Finally, a prototype field sand bypassing system consisting of a fluidizer intercepting littoral drift on a sand spit was used to feed a crater. Sand was removed by a jet pump and deposited on shore 89 meters away. Aerial photographs were taken, and beach profiles, crater, and fluidized trench were measured throughout the field tests. The field tests demonstrated that the prototype system effectively intercepted littoral drift. (WES)
W77-02933

**NUMERICAL MODELING OF RESONANT OSCILLATIONS IN DEEP DRAFT HARBORS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02935

**MODEL MATERIALS EVALUATION SAND TESTS; HYDRAULIC LABORATORY INVESTIGATION,**
Coastal Engineering Research Center, Fort Belvoir, Va., and Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8G.
W77-02938

**COOPER RIVER REDIVERSION PROJECT, BUSHY PARK WATER SUPPLY TESTS; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02939

**STABILITY OF RUBBLE-MOUND BREAKWATER LAHAINA HARBOR, HAWAII; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02940

**A VARIATIONAL APPROACH TO NONLINEAR WAVE THEORY,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02942

**TRANSMISSION OF WAVE ENERGY THROUGH AND OVERTOPPING OF THE LONG BEACH, CALIFORNIA, BREAKWATER; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02945

**FEASIBILITY OF MONITORING FLOW PATTERNS AND SEDIMENT AND POLLUTANT DISPERSION OF WATER BODIES WITH 24-CHANNEL SPECTRAL DATA,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02946

**EFFECTS OF 40-FOOT CHARLESTON HARBOR PROJECT ON TIDES, CURRENTS AND SALINITIES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02947

**NUMERICAL ANALYSIS OF TIDAL CIRCULATION FOR LONG BEACH HARBOR; REPORT 1, EXISTING CONDITIONS AND ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL STUDY,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02948

**NUMERICAL ANALYSIS OF TIDAL CIRCULATION FOR LONG BEACH HARBOR; REPORT 3, EXISTING CONDITIONS AND ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL STUDY WITH -82 FT CHANNEL,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02949

**LONG BEACH HARBOR NUMERICAL ANALYSIS OF HARBOR OSCILLATIONS; REPORT 1, EXISTING CONDITIONS AND PROPOSED IMPROVEMENTS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02950

**LONG BEACH HARBOR NUMERICAL ANALYSIS OF HARBOR OSCILLATIONS; REPORT 3, ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL PROJECT (62-AND 82-FT DEPTHS),**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02951

**DESIGN FOR WAVE PROTECTION, FLOOD CONTROL, AND PREVENTION OF SHOALING, CATTARAUGUS CREEK HARBOR, NEW YORK; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02952

**B. EVERETT JORDAN LAKE WATER-QUALITY STUDY,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02954

**LOS ANGELES AND LONG BEACH HARBORS MODEL STUDY; REPORT 3, ANALYSES OF WAVE AND SHIP MOTION DATA,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02955

**IMPROVEMENTS FOR MASONBORO INLET, NORTH CAROLINA; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02958

**GRAYS HARBOR ESTUARY, WASHINGTON, REPORT 6, 45-FT MSL (40-FT MLLW) NAVIGATION CHANNEL IMPROVEMENT STUDIES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02963

**BEACH NOURISHMENT TECHNIQUES; REPORT 1, DREDGING SYSTEMS FOR BEACH NOURISHMENT FROM OFFSHORE SOURCES,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 2J.
W77-02965

**DIGITAL-SIMULATION MODEL OF THE WENONAH-MOUNT LAUREL AQUIFER IN THE COASTAL PLAIN OF NEW JERSEY,**
Geological Survey, Trenton, N. J. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02975

**FLUME STUDIES WITH FINE AND COARSE SANDS,**
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2J.
W77-02976

**TEMPERATURE EFFECTS OF CRUDE OIL IN THE UPPER INTERTIDAL ZONE,**
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W77-03004

**IMPACTS OF CONSTRUCTION ACTIVITIES IN WETLANDS OF THE UNITED STATES,**
Tereco Corp., College Station, Tex.
For primary bibliographic entry see Field 5C.
W77-03007

**VIABLE EMBRYOGENESIS OF THE WINTER FLOUNDER PSEUDOPLEURONECTES AMERICANUS FROM -1.8 DEG TO 15 DEG C,**
State University of New York at Stony Brook. Dept. of Ecology and Evolution.
For primary bibliographic entry see Field 5C.
W77-03029

**INCREASED OPERCULAR RATES OF PINK SALMON (ONCORHYNCHUS GORBUSCHA) FRY AFTER EXPOSURE TO THE WATER-SOLUBLE FRACTION OF PRUDHOE BAY CRUDE OIL,**
California State Univ., Chico. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W77-03032

**TEMPERATURE-INDUCED CHANGES IN ACUTE TOXICITY OF ZINC TO ATLANTIC SALMON (SALMO SALAR),**
Guelph Univ., (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W77-03049

**EFFECTS OF WATER TEMPERATURE AND HOUSING CONDITIONS UPON THE AGGRESSIVE BEHAVIOR OF THE LOBSTER HOMARUS AMERICANUS,**
Dalhousie University, Halifax, Nova Scotia, Canada, Department of Psychology.
For primary bibliographic entry see Field 5C.
W77-03050

**REGULATION OF OXYGEN CONSUMPTION BY INCIDENT ILLUMINATION IN EMBRYONATED OVA OF ATLANTIC SALMON SALMO SALAR L.,**
Dalhousie Univ., Halifax, Nova Scotia. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-03051

**WINTER FLOUNDER MOVEMENTS, GROWTH, AND MORTALITY OFF MASSACHUSETTS,**
Massachusetts Dept. of Natural Resources, Sandwich. Div. of Marine Fisheries.
For primary bibliographic entry see Field 5C.
W77-03052

**ABUNDANCE AND POPULATION DYNAMICS OF PARASITES INFECTING ATLANTIC SALMON (SALMO SALAR) IN TROUT BROOK, NEW BRUNSWICK, CANADA,**
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
For primary bibliographic entry see Field 5C.
W77-03053

**THE EFFECT OF TEMPERATURE-SALINITY COMBINATIONS ON THE FUNCTIONAL WELL-BEING OF ADULT LYTECHINUS VARIEGATUS (LAMARCK) (ECHINODERMATA, ECHINOIDEA),**
University of South Florida, Tampa. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-03054

**REPRODUCTION OF WHITE PERCH IN THE LOWER HUDSON RIVER,**
New York Power Pool, Schnectady, N. Y. Environmental Affairs Office.
J. G. Holsapple, and L. E. Foster.
New York Fish and Game Journal, Vol. 22, No. 2, July 1975, p 122-127, 6 tab, 5 ref.

Descriptors: *Baseline studies, *Reproduction, *Fish reproduction, *Hudson River, *White perch, Spawning, Temperature, Salinity, Estuaries, Water temperature, Water pollution effects.

Baseline information is presented on the reproductive potential of the white perch population of the Hudson River estuary, as derived from data collected between river miles 40 and 60 in 1972. The estimated average number of eggs spawned by 3-year-old fish was 20,676 and for 9-year-old fish was 135,389. Field observation indicated that the peak of white perch spawning occurred in June when water temperatures were 18C to 20C and salinity remained below 1.0 ppt. (Chilton-ORNL)
W77-03058

# 3. WATER SUPPLY AUGMENTATION AND CONSERVATION

## 3A. Saline Water Conversion

**SOLAR DISTILLATION IN CHILE,**
Universidad Tecnica Federico Santa Maria, Valparaiso (Chile). Solar Energy Research Center.
J. R. Hirschmann.
Desalination, Vol. 17, No. 1, p 17-30, August, 1975. 13 fig, 14 ref.

Descriptors: *Solar distillation, *Solar stills, *Desalination, *Desalination apparatus, Distillation, Water treatment, Desalination plants, Impaired water quality, Potable water, Saline water, Saline water systems, Water supply, Water purification, Desalination processes, Arid lands, Filtration, Water sources, Salinity, Salts.
Identifiers: *Chile.

Solar distillation in Chile is described. A historical overview of this process and a discussion of the apparatus used are given. 'Natural distillation' caused by coastal fog is explained and its various uses evaluated. The two types of direct distillation solar equipment: stills with an evaporation wick and basin-type stills, as well as indirect solar distillation, are considered. Conclusions are presented regarding the application of these processes in the arid regions of northern Chile. The cultivation of plants carried out under plastic tents and use of desalinated water are also discussed. (Jamail-Arizona)
W77-02862

**DRINKING WATER SUPPLY IN KRASNOVODSK, (IN RUSSIAN),**
Krasnovodsk Heat and Power Plant (USSR).
Yu. Sh. Kegamyan, A. I. Egorov, and L. S. Alekseev.
Probl Osvo Pustyn' 5, p 75-77. 1975.

Descriptors: *Potable water, Water supply, *Distillation, *Desalination plants.
Identifiers: Krasnovodsk, Turkmen-SSR, USSR, *Caspian Sea.

The distilling plant which produces drinking water from distillate from desalinizers of Caspian Sea water is described by a flow diagram.--Copyright 1976, Biological Abstracts, Inc.
W77-02902

**PHYSIOLOGICAL ASSESSMENT OF CALCIUM CONTENT IN DISTILLED DRINKING WATER, (IN RUSSIAN),**
For primary bibliographic entry see Field 5F.

W77-02909

**STUDY OF THE EFFECT OF DESALTED DRINKING WATER ON THE HEALTH OF THE POPULATION, (IN RUSSIAN),**
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Public Hygiene.
For primary bibliographic entry see Field 5F.
W77-03037

## 3B. Water Yield Improvement

**LABORATORY EVALUATION OF WAX AND SILICONE FOR WATER HARVESTING ON COAL MINE SPOIL,**
Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.
D. G. Scholl.
Research Note RM-267, 4 p, August, 1976. 3 fig, 4 ref.

Descriptors: *Water harvesting, *Coal mine wastes, *Spoil banks, Runoff, Water yield improvement, *New Mexico, Reclamation, Revegetation.
Identifiers: *Waxes, *Silicones.

New Mexico coal mine spoil treated with either silicone or wax developed water-repellent crusts; the wax crust withstood disturbance better and retained more repellency. Increasing the application rate generally improved performance of both crusts. Both treatments appear suitable for harvesting water to aid plant establishment on coal mine spoil. (Witt-IPC)
W77-02589

**COMPARATIVE MORPHOLOGICAL AND ECOPHYSIOLOGICAL ASPECTS OF TWO SCLEROPHYLLOUS CHILEAN SHRUBS,**
Universidad Catolica de Chile, Santiago. Laboratorio de Botanica; and Universidad Catolica de Chile, Santiago. Inst. of Biological Sciences.
F. Riveros.
Flora, Vol. 165, No. 3, p 223-234, 1976. 8 fig, 3 tab, 19 ref.

Descriptors: *Consumptive use, *Moisture stress, *Water balance, *Soil moisture, Arid lands, Droughts, Transpiration, Rainfall, Xylem, Precipitation(Atmospheric), Soil-water-plant relationships, Plant morphology, Plant physiology, Leaves, Stomata, Root systems, *Shrubs.
Identifiers: *Cryptocarya alba, *Quillaja saponaria, Chile.

Of two evergreen woody species of Chilean mediterranean shrub, Cryptocarya alba is confined to more humid sites, while Quillaja saponaria grows also abundantly on sunny arid slopes. Morphological and functional aspects are analyzed in order to understand the mechanisms that allow these plants to grow under semiarid climatic conditions. In regions with mediterranean climates the soil profiles are moistened by winter and spring rainfall. At the beginning of summer the soil dries out, starting from the surface. At the beginning of the drought period stomatal control reduces the loss of water. Q. saponaria, due to its deeper root system, gets to the deeper soil profile layers which retain moisture even during the summer. For this reason the water balance is maintained without significant fluctuations throughout the year. The findings contribute to an understanding of why C. alba is confined to areas of higher moisture, while Q. saponaria is able to grow in places of much greater aridity. (Jamail-Arizona)
W77-02858

**CONSERVING WATER BY ANTITRANSPIRANT TREATMENT OF PHREATOPHYTES,**
California Univ., Davis. Water Science and Engineering Section.
D. C. Davenport, P. E. Martin, E. B. Roberts, and R. M. Hagan.
Water Resources Research, Vol. 12, No. 5, p 985-990, October, 1976. 6 fig, 9 tab, 32 ref.

Descriptors: *Antitranspirants, *Phreatophytes, *Application methods, *Water conservation, Transpiration control, Transpiration, Water yield improvement, Foliar, Foliar application, Canopy, Cottonwoods, Spraying, Hydrology, Watersheds(Basins), Stomata.
Identifiers: Salt cedar, Willow.

The use of antitranspirants in hydrology seeks to curtail transpiration from forested watersheds and riparian vegetation, such as salt cedar, without removing the vegetation or damaging the ecological balance. There are two main groups of antitranspirants: (1) stomatal inhibitors, which prevent the stomatal pore from opening fully, and (2) film-forming materials, which externally cover or plug stomatal pores. Basic information is provided on foliar coverage of three phreatophytes (salt cedar, willow, and cottonwood) by a wax-based film-forming antitranspirant and the effects of this coverage on transpiration, diffusive resistance, and water potential. Antitranspirants were applied by hand sprayer or backpack mist blower. Transpiration was measured by periodic weighing of potted plants and by gas hygrometer. Resistance to water vapor diffusion from the foliage was measured by a porometer and plant water potential by a pressure chamber. The results are presented. Foliar application by hand sprayer or backpack mist blower of a wax-based antitranspirant increased resistance to water vapor diffusion from phreatophyte foliage and decreased transpiration, indicating the potential of this nondestructive approach to water conservation. (Jamail-Arizona)
W77-02863

**AERIAL SPRAYING OF PHREATOPHYTES WITH ANTITRANSPIRANT,**
California Univ., Davis. Water Science and Engineering Section.
D. C. Davenport, P. E. Martin, and R. M. Hagan.
Water Resources Research, Vol 12, No 5, p 991-996, October, 1976. 6 fig, 6 tab, 7 ref.

Descriptors: *Antitranspirants, *Spraying, *Phreatophytes, *Application methods, Consumptive use, Streamflow, Groundwater, Groundwater basins, Water conservation, Water yield improvement, Transpiration, Transpiration control, Chemcontrol, Cottonwoods, Canopy, Foliar, Foliar application.
Identifiers: Salt cedar, Willow, *Aerial spraying.

The use of antitranspirants for water conservation by reducing phreatophyte transpiration is discussed. Experiments were conducted to determine whether aerial spraying of a wax-based antitranspirant emulsion would provide adequate spray coverage and reduce transpiration. Multiple passes were made with (1) a fixed wing plane on salt cedar, cottonwood, and willow and (2) a helicopter on salt cedar. Spray coverage was also conducted on the ground. Scanning electron microscope photomicrographs showed considerable antitranspirant on foilage in the upper canopy and lesser amounts in the lower; the film was detected even 24 days after spraying. Aerially applied antitranspirant increased resistance to leaf water vapor diffusion by 150 percent during the first few days and by 80 percent thereafter. Results then show that (1) good coverage can be achieved by multiple passes of the aircraft and deep antitranspirant spray penetration into dense canopies is not as important as coverage of the outer foilage and (2) transpiration rates can be retarded without foliar damage. However, full assessment of the antitranspirant spraying must await more extensive field trials. (Jamail-Arizona)
W77-02867

**WATER QUALITY EFFECT OF DIKING A SHALLOW ARID-REGION LAKE,**
Brigham Young Univ., Provo, Utah.
For primary bibliographic entry see Field 5C.
W77-02871

**COLORADO RIVER BASIN PILOT PROJECT, COMPREHENSIVE EVALUATION REPORT, FIVE WINTER SEASONS 1970-71 TO 1974-75,**
Aerometric Research Inc., Goleta, Calif.
R. D. Elliott, R. W. Shaffer, A. Court, and J. F. Hannaford.
Prepared for Bureau of Reclamation, Denver, Colorado, Div. of Atmospheric Water Resources Management. Report ARI-76-1, October 1976. 641 p, 72 fig, 47 tab, 53 ref, 4 append. Bur Reclaim Contract 14-06-D-7332.

Descriptors: Atmosphere, Clouds, Meteorology, *Nucleation, Orography, Precipitation(Atmospheric), River basins, Runoff, Silver iodide, Snow, Snowpacks, *Weather modification, *Colorado River Basin, Wind velocity, Meteorological data.
Identifiers: San Juan Mountains(Colo), *Nucleant dispersion.

The primary objectives of this evaluation have been to (1) test the physical concepts of weather modification potential, and (2) test the practical weather modification potential for an operations program, as carried out in the Colorado River Basin Pilot Project during the five winters of 1970-71 through 1974-75. The first objective is approached through an investigation of nucleant dispersion based on wind flow, an analysis of precipitation and rawinsonde data that is essentially diagnostic in character, and an analysis of surface runoff related to precipitation. The second objective is carried out through detailed analyses of precipitation and other records for all five years of the pilot project operation. Conclusions and recommendations are presented which can serve as guidance material for planning orographic research projects. (Bur Reclam)
W77-03060

## 3C. Use Of Water Of Impaired Quality

**TRICKLE-DRIP IRRIGATION: PRINCIPLES AND APPLICATION TO WATER MANAGEMENT IN TROPICAL SOILS,**
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W77-02868

**EFFECT OF IRRIGATION ON SOME PROPERTIES OF SOUTHERN CHERNOZEMS, (IN RUSSIAN),**
Moscow State Univ. (USSR). Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W77-02889

**ADAPTATION TO INCREASING SALINITY OF THE COLORADO RIVER,**
California Univ., Davis. Dept. of Land, Air and Water Resources.
F. E. Robinson, J. N. Luthin, R. J. Schnagl, W. Padgett, and K. K. Tanji.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 082, Price codes: A04 in paper copy, A01 in microfiche. California Water Resources Center, Contribution 160, Completion Report, October 1976. 51 p, 3 fig, 32 tab, 20 ref, 2 append. USDA Regional Research Project 129. (California Water Resources Center Projects UCAL-WRC-W-418 and W-482). OWRT A-052-CAL(2) an
s: *Salinity, *Saline soils, *Crop production, *Sprinkler irrigation, Salts, *California, Colorado River, *Salt tolerance, Leaching, Soil profiles.

Identifiers: *Imperial Valley(Calif).
W77-02997

**SOIL WATER EXTRACTION BY ALFALFA,**
North Dakota State Univ., Fargo. Dept. of Soils.
L. J. Brun, and B. K. Worcester.
Agronomy Journal, Vol. 67, No. 4, p 586-589, July-August 1975. 3 fig, 2 tab, 9 ref.

Descriptors: *Saline soils, *Salinity, *Alfalfa, Crop response, Crop production, *Soil water, Moisture tension, North Dakota, Montana.

Saline seeps have developed because of the accumulation of water beyond the rooting zone of annual crops. The purpose of this experiment was to show the potential of alfalfa to extract soil water under a variety of textural and salinity conditions. Core samples were taken in alfalfa fields and fields under crop-fallow management to evaluate their present water content, 15 atm. percentage, texture, and salinity level. Significant extraction of soil water occurs to depths of 3 to 4 m. Alfalfa extracted soil water held at a tension greater than 15 atm. in both saline and non-saline segments of the soil profile. A minimum soil moisture level was reached at the 1.22 to 2.44 m depth in alfalfa fields maintained 5 years. Alfalfa is an invaluable crop for reducing soil wetness to alleviate the saline-seep problems of western North Dakota and eastern Montana. (Skogerboe-Colo St)
W77-03064

**MINIMAL LEACHING WITH VARYING ROOT DEPTHS OF ALFALFA,**
Agricultural Research Service, Riverside, Calif. Salinity Lab.
L. Bernstein, L. E. Francois, and R. A. Clark.
Soil Science Society of America Proceedings, Vol 39, No. 1, p 112-115 January-February 1975. 3 fig, 2 tab, 5 ref.

Descriptors: *Leaching, *Alfalfa, Salinity, Lysimeters, Return flow, Saline water, Crop response, Salt tolerance, *Root development.

Alfalfa was grown in greenhouse lysimeters with soil depths of 60, 120, and 180 cm to determine whether rooting depth affected tolerance to the low leaching percentage of 6.25. Salinities of the drainage waters averaged about 6 mmho/cm for the controls irrigated with 0.4 mmho/cm water, and 26 mmho/cm for lysimeters irrigated with 2.0 mmho/cm water. Steady-state salinity profiles were maintained for 3 years. Yields with the more saline water averaged 23% less than those of the controls, in good agreement with previous findings, but were not significantly affected by lysimeter depth. Water requirements and uptake of chloride and sodium were only slightly affected by lysimeter depth. Salinity profiles with maximum salinities of 26 mmho/cm in the soil water can, therefore, be compressed into a little as a 60-cm depth with no greater effects on yield or salt uptake by the crop than those obtained with salinity profiles extended over 120 or 180 cm. (Skogerboe-Colo St)
W77-03066

**COMBINED EFFECTS OF LOW OXYGEN AND SALINITY ON GERMINATION OF A SEMI-DWARF MEXICAN WHEAT,**
Escuela Nacional de Agricultura, Chapingo (Mexico). Colegio de Postgraduados.
E. Aceves-N, L. H. Stolzy, and G. R. Mehuys.
Agronomy Journal Vol. 67, No. 4, p 530-532, July-August, 1975. 4 fig, 1 tab, 7 ref.

Descriptors: *Oxygen, *Oxygen requirements, *Wheat, Crop response, Salinity, Soil salinity, Germination, Seeds.
Identifiers: *Soil aeration, Mexican wheat(Semi-dwarf).

The simultaneous occurrence of low oxygen and high salinity conditions is common in a wide range of irrigated soils. The combined effects of 02 and osmotic potential stresses on germination of wheat were tested under growth chamber conditions. A range of 02 concentrations and salinity levels were chosen to simulate soil aeration and salinity combinations that might be expected to occur in well-aerated, fine-textured, saline, and saline-sodic soils. Daily observations of number of seeds germinated and days to first germination were recorded. (Skogerboe-Colo St)
W77-03068

## 3D. Conservation In Domestic and Municipal Use

**MUNICIPAL WASTEWATER RECYCLING: A STRATEGY FOR MEETING THE ZERO DISCHARGE GOAL OF PL 92-500,**
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 5D.
W77-02620

**HYDROLOGY,**
Geological Survey, Raleigh, N.C. Water Resources Div.
For primary bibliographic entry see Field 6B.
W77-02968

**WATER QUANTITY REQUIREMENTS FOR PUBLIC SUPPLIES AND OTHER USES,**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-02969

## 3E. Conservation In Industry

**SOME INTERNAL MEASURES FOR REDUCING EFFLUENT LOAD, FOR EXAMPLE, IN A CALCIUM BISULFITE MILL (EINIGE INNERBETRIEBLICHE MASSNAHMEN ZUR VERMINDERUNG DER VORFLUTERBELASTUNG, DARGESTELLT AM BEISPIEL EINER CALCIUMBISULFITFABRIK),**
Schwaebische Zellstoff A. G., Ehingen/Donau (West Germany).
For primary bibliographic entry see Field 5D.
W77-02576

**WATER RESOURCE MANAGEMENT IN THE CZECHOSLOVAKIAN PAPER INDUSTRY DURING THE FIFTH FIVE-YEAR PLAN PERIOD (VODNI HOSPODARSTVI PAPIRENSKEHO PRUMYSLU CSR V PATE PETILETCE),**
F. Nemec.
Papir a Celuloza, Vol. 31, No. 6, p 130-131, 1976. 2 tab.

Descriptors: *Pulp and paper industry, *Water conservation, Fresh water, Water pollution sources, Foreign countries, Europe, Dissolved solids, Water pollution control, Water pollution treatment, Water management(Applied), Effluents.
Identifiers: *Czechoslovakia, Sulfite mills, Kraft mills, Fiber recovery.

During the 1971-1975 period, the fresh water consumption and the fiber loss in the Czechoslovakian paper industry increased by 9.5% and 16.5%, respectively, while the total industry output increased by 31.2%. This relative improvement was achieved by the combination of in-plant water conservation measures and improved primary effluent treatment. The discharge of dissolved solids was reduced by closing several small sulfite pulp mills and replacing their capacity with a new modern kraft mill in Steti, equipped with a complete primary and secondary effluent treatment system. (Trubacek-IPC)
W77-02578

**POSSIBILITY OF INTRODUCING WASTE-FREE TECHNOLOGY IN THE PULP AND PAPER INDUSTRY (VOZMOZHNOSTI VNEDRENIYA BEZOTKHODNOI TEKHNOLOGII V OTRASLI),**
A. Ya. Tipisev, Ya. V. Nikitin, and N. K. Grigor'eva.
Bumazhnaya Promyshlennost, No 5, p 15-17, May, 1976.

Descriptors: *Pulp and paper industry, *Water pollution control, Effluents, Water conservation, Water reuse, Recycling, Solid wastes, Sludge, Fertilizers, Feeds, Additives, Incineration, Wastes, Waste disposal, Industrial wastes, Pulp wastes, Chlorine, Ammonia.
Identifiers: *Soviet Union(USSR), Pulp bleaching, Chlorine dioxide, Closed systems.

The concept of waste-free technology, as defined by the Commission on Economics of the European Common Market, is discussed, and measures already introduced towards this goal at Russian mills are indicated. Measures aimed at reducing the consumption of fresh water include dry barking, diffusion washing of pulp (in digesters or in separate diffusors), screening and beating at high consistency, manufacture of paper by the dry process, and purification and recycling of fiber-containing effluents. The Selenga pulp and board mill, located near Lake Baikal (USSR), is to be converted soon to entirely effluent-free operation, and will reduce its water consumption to 14-19 cu m/ton of product. The problem of solid wastes utilization is far from being solved. Research aimed at such utilization includes experiments on the utilization of effluent sediments as fertilizers and animal feed additives, on the recovery and utilization of gaseous by-products, and on new methods of pulping and pulp bleaching. Worth mentioning are studies on pulp bleaching with gaseous agents (such as chlorine, chlorine dioxide, ammonia) and the introduction of a fluidized-bed process for combustion of effluent sediments at the Svetogorsk and Kotlas mills. (Stapinski-IPC)
W77-02583

**AUTOMATION OF TOTAL PHENOLIC CONTENT DETERMINATION WITH THE FOLIN-CIOCALTEU REAGENT. APPLICATION TO THE STUDY OF WASTE WATERS FROM FIBERBOARD MILLS (AUTOMATISATION DE LA METHODE DE DOSAGE DES COMPOSES PHENOLIQUES TOTAUX PAR LE REACTIF DE FOLIN-CIOCALTEU. APPLICATION A L'ETUDE DES EAUX RESIDUAIRES DES USINES DE PANNEAUX DE FIBRES DE BOIS),**
Institut National de la Recherche Agronomique, Dijon (France). Technologie.
For primary bibliographic entry see Field 5A.
W77-02584

**INVESTIGATION OF COMMERCIAL CHROME-TANNING SYSTEMS: PART VI. FULL-SCALE TRIALS OF CHROME LIQUOR RECYCLING AND THE IMPORTANCE OF SALT CONCENTRATION,**
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Protein Chemistry.
For primary bibliographic entry see Field 5D.
W77-02594

**THE CONTROL OF WATER POLLUTION AND THE DISPOSAL OF SOLID WASTES IN THE INDUSTRIES PRODUCING BASIC INORGANIC CHEMICALS,**
Imperial Chemical Industries Ltd., London (England). Engineering Services Dept.
For primary bibliographic entry see Field 5D.
W77-02595

**APPLICATION OF ULTRA FILTRATION/REVERSE OSMOSIS TECHNIQUE FOR THE FRACTIONATION OF CHEESE WHEY - A WASTE DISPOSAL OF THE DAIRY INDUSTRY,**
Central Salt and Marine Chemicals Research Inst., Bhavnagar (India).
For primary bibliographic entry see Field 5D.
W77-02598

**IMPACT OF WATER CONSERVATION IN THE DESIGN OF MODERN OIL REFINERIES,**
Fluor Engineers and Constructors, Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 5D.
W77-02602

**EIGHTH MEETING OF THE IULTCS TANNERY /ASTES COMMISSION, SVENDBORG, DENMARK, 21ST TO 23RD MAY 1975.**
For primary bibliographic entry see Field 5D.
W77-02603

**BIOLOGICAL PROCESS FOR EFFLUENT AND WASTE TREATMENT AS APPLIED IN THE PAPER INDUSTRY,**
For primary bibliographic entry see Field 5D.
W77-02607

**THE MANUFACTURE AND USE OF SELECTED ALKYLTIN COMPOUNDS, TASK II,**
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W77-02634

**ECONOMIC MODELS OF WASTER USE, (RANN UTILIZATION EXPERIENCE, CASE STUDY NUMBER 4),**
Houston Univ., Tex.
For primary bibliographic entry see Field 6C.
W77-02640

**PROCEEDINGS OF: NATIONAL CONFERENCE ON HEALTH, ENVIRONMENTAL EFFECTS, AND CONTROL TECHNOLOGY OF ENERGY USE.**
Environmental Protection Agency, Washington, D. C. Office of Energy, Minerals and Industry.
For primary bibliographic entry see Field 5G.
W77-02649

**AN ENVIRONMENTAL OVERVIEW OF UNITED STATES ENERGY FUTURES,**
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02650

**MONITORING WESTERN ENERGY RESOURCE DEVELOPMENTS,**
Environmental Monitoring and Support Lab., Las Vegas, Nev.
For primary bibliographic entry see Field 5G.
W77-02651

**WILDLIFE AND OIL SHALE. A PROBLEM ANALYSIS AND RESEARCH PROGRAM.**
Thorne Ecological Inst., Boulder, Colo.
For primary bibliographic entry see Field 5G.
W77-02659

**REVIEW OF ENVIRONMENTAL CONTROL OF MERCURY IN JAPAN,**
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W77-02761

**MODIFICATION OF THE TRADITIONAL SEQUENCE FOR THE TREATMENT OF WASTEWATERS FROM METAL FINISHING INSTALLATIONS,**
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5D.
W77-02762

**REMOVAL AND RECOVERY OF METALS FROM SLUDGE AND SLUDGE INCINERATOR ASH,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5D.
W77-02763

**HEAT AND MASS TRANSFER IN MODELS OF UNDEVELOPED GEOTHERMAL FIELDS,**
Colorado Univ., Boulder. Dept. of Engineering.
For primary bibliographic entry see Field 4B.
W77-02805

**IMPLICATIONS OF THE WATER POLLUTION CONTROL ACT OF 1972 FOR THE MINERAL RESOURCES INDUSTRY, A SURVEY.**
Bureau of Mines, Washington, D.C. Div. of Melallurgy.
For primary bibliographic entry see Field 5G.
W77-02806

**THE EFFECTS ON AGRICULTURE IN UTAH OF WATER TRANSFERS TO OIL SHALE DEVELOPMENT,**
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W77-02829

**WATER QUANTITY REQUIREMENTS FOR PUBLIC SUPPLIES AND OTHER USES,**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-02969

**HYDROLOGIC STUDIES OF THE U.S. GEOLOGICAL SURVEY RELATED TO COAL DEVELOPMENT IN COLORADO.**
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5G.
W77-02970

## 3F. Conservation In Agriculture

**USDA RESEARCH AND DEVELOPMENT ON EFFECTS OF ENERGY PRODUCTION AND USE OF FRESHWATER RESOURCES,**
Forest Service (USDA), Washington, D.C.
For primary bibliographic entry see Field 5G.
W77-02656

**SEASONAL WATER USE OF IRRIGATED PASTURE GRASSES UNDER PERMANENTLY-SET IRRIGATION AS RELATED TO CLIMATIC FACTORS,**
Nebraska Univ., Lincoln. Dept. of Agronomy.
J. T. Nichols.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 989, Price codes: A02 in paper copy, A01 in microfiche. Completion Report, August 1976. 8 p, 11 ref. OWRT A-032-NEB(1). 14-34-0001-6028.

Descriptors: Irrigation, *Grasses, *Irrigation water, Water wastes, Seasonal, *Crop production, *Water utilization, Irrigated land, Pastures.
Identifiers: *Production efficiency(Irrigation water).

From 1973 to 1975 seasonal and peak water use by eight grasses were determined under irrigated pasture conditions while being grazed by yearling steers during spring and summer and weaned calves in the fall. Weather parameters of air temperature, relative humidity, wind and radiation were measured to determine their relationship to water use by these cool-season grasses. Total water use among grasses was not significantly different, but yearly differences occurred with average water use of 43.16 inches in 1974 and 37.50 inches in 1975. The periods of peak water use were July 22-29, 1974 (0.46 inches per day) and June 16-24, 1975 (0.31 inches per day). Water use rates were correlated with evaporation (r = .63), mean daily temperature (r = .54), and maximum temperature (r = .53) for season-long measurements, mean wind (r = .58) for June, and maximum wind (r = .62) for July. In regression analysis, evaporation, years, mean relative humidity and mean wind were major sources of variance for season-long water use. Production efficiency of irrigation water applied is ultimately expressed in the efficiency of animal gain per unit of water applied. Animal weight gain per acre-inch of irrigation water applied. was: intermediate wheatgrass 39.14: orchard-grass 32.99; Garrison creeping foxtail 32.29; meadow bromegrass 32.00; smooth bromegrass 31.27; Reed canarygrass 26.49; Russian wildrye 25.06; and tall fescue 18.65.
W77-02834

**WATER UNDER THE SAND,**
For primary bibliographic entry see Field 4B.
W77-02852

**STRUCTURAL COMPOSITION AND SOME PROBLEMS OF THE WATER REGIME OF DARK-CHESTNUT SOILS OF THE KUSTANAI OBLAST IN CONNECTION WITH THE DURATION OF THEIR CULTIVATION, (IN RUSSIAN),**
For primary bibliographic entry see Field 2G.
W77-02853

**DISTRIBUTION OF WATER AND IONS IN SOILS IRRIGATED AND FERTILIZED FROM A TRICKLE SOURCE,**
Agricultural Research Organization, Bet Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
B. Bar-Yosef, and M. R. Sheikholslami.
Soil Science Society of America, Journal, Vol. 40, No. 4, p 575-582, 1976. 4 fig, 12 tab, 11 ref.

Descriptors: *Irrigation practices, *Irrigation efficiency, *Irrigation systems, *Subsurface irrigation, *Application methods, Irrigation, Water distribution(Applied), Infiltration, Ion transport, Mathematical models, Moisture content, Soil types, Discharge(Water), Clays, Denitrification, Sands, Phosphates, Nitrates, Hydraulic conductivity.
Identifiers: *Trickle irrigation.

Trickle irrigation is becoming increasingly important in modern agriculture, but the simultaneous distribution of water and nutrients emerging from a trickle source has been insufficiently studied. This paper reports a laboratory study of simultaneous distributions of water, NO3-N and P in clay and sandy soils irrigated daily from a trickle source. Hydraulic conductivity data, water retention curves and absorption isotherms to the soils were determined to enable verification of mathematical models against the experimental results obtained under various conditions. Adding identical amounts of water but increasing the trickle discharge rate in the sandy soil from 250 to 2,500 milliliters per hour increased the vertical movement of the wetting front and decreased horizontal movement. In a sequence of three cycles of irrigation with a nutrient solution, losses of nitrate were observed in the clay soil, probably due to denitrification processes. The restricted mobility of the

phosphate ions, even in the sandy soil, implies that a preirrigation mixing of P in the soil, supplemented by its addition to the irrigation solution, is necessary to obtain a uniform P concentration in the soil volume. (Jamail-Arizona)
W77-02855

**COMPARISON OF IRRIGATION SCHEDULES BASED ON PAN EVAPORATION AND GROWTH STAGES IN WINTER WHEAT,**
Punjab Agricultural Univ., Ludhiana (India).
S. S. Prihar, K. L. Khera, K. S. Sandhu, and B. S. Sandhu.
Agronomy Journal, Vol. 68, No. 4, p 650-653, July-August 1976. 2 fig, 3 tab, 11 ref.

Descriptors: *Irrigation efficiency, *Irrigation effects, *Wheat, *Evaporation pans, *Growth stages, Crop response, Water conservation, Irrigation practices, Water management(Applied), Crop production, Irrigation water.
Identifiers: *Irrigation schedules, Winter wheat, Pan evaporation ratio.

Water use efficiency is improved by irrigation of winter wheat (Triticum aestivum) using a ratio of some fixed amount of irrigation water (IW) to pan evaporation, PAN-E, (cumulative evaporation from U.S. Weather Bureau class A pan less rain since previous irrigation) and scheduling according to growth stages. In a 2-year field study, IW/PAN-E ratios of 0.75 and 0.9 for scheduling irrigation to winter wheat irrespective of growth stage were compared with a combination of IW/PAN-E with growth stages and the conventional technique of irrigating at five growth stages. The 0.75 ratio irrespective of growth stage produced as large a grain yield as irrigation at five growth stages while using an average of 12 cm less irrigation. Combining IW/PAN-E with growth stages did not improve the yield. The major advantage of this approach is that the farmer need not change the amount of water from one application to the next. With rain the interval for the next irrigation would increase. (Jahns-Arizona)
W77-02857

**CONSUMPTION USE AND WATER REQUIREMENT OF DWARF WHEAT IN LIGHT TEXTURE SOILS OF RAJASTHAN,**
S. K. N. Coll. of Agriculture, Jobner (India).
T. C. Jain, and K. C. Jain.
Annals of Arid Zone, Vol. 14, No. 3, p 212-220, September, 1975. 1 fig, 4 tab, 6 ref.

Descriptors: *Irrigation effects, *Consumptive use, *Water requirements, *Soil moisture, *Moisture uptake, Soil types, *Wheat, Soil texture, Sands, Water utilization, Irrigation, Moisture content, Water loss, Moisture deficit, Evaporation, Growth stages, Crop production, Irrigation efficiency, Evaporimeters.
Identifiers: *Rajasthan, *India.

Wheat is one of the most important irrigated crops grown in the northwestern part of Rajasthan, India. An experiment was conducted to determine the consumptive use and soil moisture depletion pattern of Kalyan Sona wheat, a dwarf variety, in light textured soils. Results indicate that over 60 percent of the water consumed by the crop was obtained from the upper 30 centimeters of soil layer and less than 40 percent from the 30 to 60 centimeters depth. The consumption below 60 centimeters soil depth was very little. The overall soil moisture loss from different irrigation treatments is given. These data indicate the increased water requirement with increase in age of the crop. Thus, the stage of crop growth and the evaporative demand determined the loss of moisture from the soil. Applying 40 to 50 millimeters of water after a cumulative pan evaporation of 45 to 55 millimeters from standard U.S. Pan evaporimeter was found optimum. The total number of irrigations thus required were 8 to 10 with a total depth of 360 to 450 millimeters. (Jamail-Arizona)
W77-02860

**ANOMALOUS WATER RELATIONS IN COPPER-DEFICIENT WHEAT PLANTS,**
Waite Agricultural Research Inst., Glen Osmond (Australia). Dept. of Agronomy.
For primary bibliographic entry see Field 2I.
W77-02861

**AUTOMATED CONTROL OF TRICKLE IRRIGATION IN CITRUS,**
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
J. D. Busman.
Master of Science Thesis, 1976. 82 p, 6 fig, 2 tab, 13 ref, 3 append.

Descriptors: *Irrigation systems, *Irrigation practices, *Irrigation efficiency, *Irrigation effects, *Citrus fruits, Oranges, Irrigation, Consumptive use, Agriculture, Fruit crops, Soil moisture, Moisture tension, Evaporation pans, Nuclear moisture meters, Irrigation water, Tensiometers, Arizona, Mathematical models.
Identifiers: *Automatic control, *Trickle irrigation.

In recent years the level of interest in trickle irrigation has increased significantly and much work has been done in the design of trickle systems for use in citrus irrigation. This study evaluates an automatic control system, constructed using digital logic, designed to regulate trickle irrigation. The system used an instrumented evaporation pan and an instrumented tensiometer as inputs to a controller. Evaporation from the pan was used to make an estimate of consumptive use of the citrus trees. When soil moisture tension was at the desired level, the controller would allow flow through the trickle system to satisfy this estimate. Soil moisture tensions above or below the desired level would result in irrigation above or below the consumptive use estimate respectively. The operation of the control system was tested in a plot of Valencia orange trees near Tacna, Arizona. The theory involved, the system design and construction, and its operation are evaluated. The data available show that the control system does perform as designed. (Jamail-Arizona)
W77-02864

**TRICKLE-DRIP IRRIGATION: PRINCIPLES AND APPLICATION TO WATER MANAGEMENT IN TROPICAL SOILS,**
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
E. Bresler.
Agronomy Mimeo 75-14, July 1975. 81 p, 17 fig, 3 tab, 34 ref, append.

Descriptors: *Irrigation systems, *Water management(Applied), *Surface irrigation, *Irrigation efficiency, *Irrigation practices, Irrigation, Tropical regions, Crop production, Mathematical models, Salinity, Clogging, Soil water, Infiltration, Irrigation water, Agriculture, Irrigation design, Soil surfaces.
Identifiers: *Trickle-drip irrigation.

The use of trickling or dripping as a method of irrigating large fields has become quite common practice in agricultural production all over the world. The general principles of trickle irrigation are presented, its advantages and disadvantages evaluated, and its application to tropical soils discussed. The surface approach, as opposed to underground trickling (subsurface irrigation) was initiated in Israel and has been widely used for the past few years. This system with its high irrigation frequency increases crop yield, minimizes the salinity hazard to plants, allows continuous application of fertilizers and saves water. These advantages among others are discussed in detail. Some problems concerning the practical use of the method still exist. Operational difficulties of the trickling method may sometimes arise from the clogging of the drippers. Additional problems occur in arid regions where saline water must be used in that there is a tendency for salt to accumulate close to the wetted zone. A mathematical model is employed. (Jamail-Arizona)
W77-02868

**CROP PRODUCTION IN THE ARID ZONE WITH SPECIAL REFERENCE TO WESTERN RAJASTHAN,**
Central Arid Zone Research Inst., Jodhpur (India).
H. S. Mann, and R. P. Singh.
Annals of Arid Zone, Vol 14, No 4, p 347-357, December, 1975. 9 tab.

Descriptors: *Crop production, *Agronomic crops, *Irrigation canals, *Arid lands, Oilseed crops, Rice, Fertilizers, Irrigation, Planting management, Agriculture, Crops, Wells, Water sources, Land use, Irrigation water, Water conveyance, Soil management, Land management.
Identifiers: Rajasthan, *India.

The arid regions of India comprise a sizeable portion of the total geographical area of the country and contain concentrations of population. Agriculture in these arid regions is considered a necessary, but risky, undertaking. The crop production potentialities of arid lands in the state of Rajasthan are examined, and the types of crops under cultivation are discussed. Rice is one of the major crops of the state, much of it coming from the arid zones, oilseeds are a second major crop grown in the arid regions. Irrigation plays a vital role in the state's agricultural production. In Rajasthan, wells are the major source of irrigation water, followed by canals and tanks. With the completion of the Rajasthan Canal Project in the near future, the contributions of the arid regions will be significantly increased. The use of fertilizers in the area is also discussed. Enormous potential exists for the arid lands of Rajasthan and can be best exploited through proper soil and crop management. (Jamail-Arizona)
W77-02869

**THE PRODUCTIVENESS OF LOESS SOILS OF DIFFERENT DEGREES OF EROSION, (IN GERMAN),**
Giessen Univ. (West Germany).
T. Harrach.
Land-Wirtsch Forsch 28(3), p 190-199, 1975.

Descriptors: *Loess, *Crop production, *Crop response, *Nutrient requirements, *Soil-water-plant relationships, *Gray-brown podzolic soils, Soil erosion, Water requirements, Land use, Cultivated lands, Soil groups, Soil types, Podzols.
Identifiers: West Germany, Hesse, Pararendzinas, Kolluvisols.

In the loess areas of Hesse (West Germany) the cropyield on Gray Brown Podzolic soils, Pararendzinas and Kolluvisols is characterized by great deviation but there were no definite differences among 4 soils examined. The potential productivity of all 4 soils is very high. A great number of the eroded loess soils - especially Pararendzinas - are so poor in nutrients that the plants show excessively high consumption of water and low yield. Other reasons for the deviations in crop yield on similar soils are the land use system and the climate. The physical and biological condition of the cultivated soil seems to determine crop yield, especially of the Gray Brown Podzolic soil and partly of the Kolluvisols. The valuation of loess soils of different degrees of erosion in the 'Reichsbodenschatzung' (German Valuation of Soils) is also discussed and the importance of soil conservation is pointed out.--Copyright 1976, Biological Abstracts, Inc.
W77-02891

**METABOLISM OF PROTEIN AND NUCLEIC ACIDS DURING ADAPTATION TO VARIOUS TYPES OF DROUGHT, (IN RUSSIAN),**
Vsesoyuznyi Institut Rastenievodstva, Leningrad (USSR).
N. N. Kozhushko, and G. V. Udovenko.

Fiziol Rast (Mosc) 22(6), p 1239-1244, 1975.

Descriptors: *Droughts, *Metabolism, *Drought tolerance, *Proteins, *Wheat, *Drought resistance, Fertilization.
Identifiers: *Nucleic-Acids.

The content of nucleic acids and protein in the leaves of wheat characterized drought resistance of the variety only in the course of restoration of the normal state of plants after drought and when there were favorable conditions for the adaptation of plants to drought. The degree of disturbance of the reproductive process under the conditions of drought, which was manifested as incompletely fertilized ear, supposedly depended on the degree of deviation of the dynamic equilibrium and metabolism from the normal state rather than on a degree in the content of nucleic acids and protein.--Copyright 1976, Biological Abstracts, Inc.
W77-02926

**THE AERATION CONDITIONS OF SOUTHERN AND CISCAUCASIAN CHERNOZEMS UNDER IRRIGATION, (IN RUSSIAN),**
Moscow State Univ. (USSR). Dept. of General Soil Sciences.
For primary bibliographic entry see Field 2G.
W77-02927

**DETERMINATION OF THE CRITICAL DEPTH FOR BAGAEVSKO-SADKI IRRIGATION SYSTEM, (IN RUSSIAN),**
Moscow State Univ. (USSR). General Soil Sciences.
E. G. Morgun.
Vestn Mosk Univ. Ser VI Biol Pochvoved 30(5), p 117-119, 1975.

Descriptors: *Irrigation systems, *Depth, Drainage, *Soils, Methodology.
Identifiers: *Bagaevsko-Sadki(USSR), Russian-Sfsr, USSR.

The critical depth was found by the method suggested by Sabolch. This method was effective for the evaluation of the critical depth and distinguishing the soil plots with different meliorative conditions (Russian SFSR, USSR). The relation between the critical depth and disposition of the irrigation and drainage system was investigated.--Copyright 1976, Biological Abstracts, Inc.
W77-02928

**PHYSICAL AND CHEMICAL PROPERTIES OF TAKYR SOILS AND CHANGES IN THEIR AGROCHEMICAL PROPERTIES AFTER IRRIGATION, (IN RUSSIAN),**
A. Gaipova, O. Eshchekov, and L. Orazova.
Probl Osvo Pustyn' 6, p 21-27, 1975.

Descriptors: Soils, *Irrigation, *Soil physical properties, *Soil chemical properties, Carbonates, Gypsum, Salts, Fertilization, *Fertilizers.
Identifiers: *Takyr soils, USSR.

The pre- and post-irrigational (12-yr) irrigation) agrochemical features of the takyr soils in the Tedzhen oasis (USSR) were studied. An attempt was also made to determine the optimum rate of fertilization. Long-term irrigation and application of mineral fertilizers influence the most mobile soil components -readily soluble salts, gypsum and, to a lesser degree, carbonates.--Copyright 1976, Biological Abstracts, Inc.
W77-02929

**ANNUAL DYNAMICS OF SOLUBLE SALTS IN THE SOILS OF AN IRRIGATED FIELD WITH BOTH DEEP CLOSED AND OPEN DRAINAGE AT THE BAGAEVSKO-SADKOVSKAYA IRRIGATION SYSTEM, (IN RUSSIAN),**
Moscow State Univ. (USSR). General Soil Sciences.
E. G. Morgun.
Vestn Mosk Univ. Ser VI Biol Pochvoved 30(4), p 102-105, 1975.

Descriptors: *Irrigation systems, *Annual, *Salts, *Soils, Drainage.
Identifiers: USSR, Bagaevsko-sadkovskaya(USSR).

Water and salt regimes of irrigated Caucasus chernozems (Russian SFSR, USSR) under deep drainage were investigated. A 3-m layer of the aerated zone is an active zone of vertical migration of water and soluble salts. An accumulation of soluble salts in winter was noted. In later periods a reduction of salt content in the upper meter with a simultaneous increase of salts in the lower layers took place. The source of the soluble salts is the lower layers of the aerated zone and ground waters.--Copyright 1976, Biological Abstracts, Inc.
W77-02930

**AN APPRAISAL OF GROUND WATER FOR IRRIGATION IN THE APPLETON AREA, WEST-CENTRAL MINNESOTA,**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02982

**THE GROWTH AND YIELD OF POPLAR CULTURES UNDER WATERING AND FERTILIZATION CONDITIONS, (IN BULGARIAN),**
Research Station of Rapid-Growth Tree Species, Svistov (Bulgaria).
D. A. Denev.
Gorsko Stop Nauka. 11(5), p 53-62, 1974.

Descriptors: *Growth rates, *Deciduous trees, *Trees, *Water requirements, *Fertilization, *Irrigation effects, Height, Cultures, Nitrogen, Phosphorus, Drainage effects, Drainage area, Groundwater availability, Nutrients, Soil moisture, Soil-water-plant relationships, Fertilizers.
Identifiers: *Poplars, Populus euramericana, Wood mass, Basal area, *Danube River basin.

The growth of poplars on drained land along the Danube River was suboptimal due to drought and low subterranean water supply during the vegetation period and the limited soil nutrient supply. Populus euramericana cv. Vernirubens were given NPK, N-P, PK mixtures under natural soil moisture conditions; some were irrigated with 200 mm water in 3 yr. Fertilization alone had a limited effect but NPK fertilization with irrigation increased the basal area by 22.10%, height by 17.85% and wood mass by 47.20%. Results obtained with nitrogen and phosphorus individually with irrigation were almost identical and this method is recommended.--Copyright 1975, Biological Abstracts, Inc.
W77-03040

**CALCULATION OF RATE OF NUTRIENT UPTAKE BY GROWING ROOTS,**
National Fertilizer Development Center, Muscle Shoals, Ala.
For primary bibliographic entry see Field 2I.
W77-03061

**FIELD CHANNELS: A KEY TO BETTER INDIAN IRRIGATION,**
Minnesota Univ., St. Paul. Dept. of Agricultural and Applied Economics.
K. W. Easter.
Water Resources Research, Vol. 11, No. 3, p 389-392, June 1975. 3 tab, 8 ref.

Descriptors: Irrigation, Irrigation effects, Surface irrigation, Flood irrigation, Irrigation systems, *Irrigation canals.
Identifiers: *India, *Field channels(Irrigation).

Two different programs which attempted to improve water use and management were evaluated in eastern India. The improvement was through the installation of field channels in existing flood irrigation projects. The channels gave farmers better control over water on each field. The analysis highlights the importance of technically trained people and low-cost project designs in making projects viable. Annual net returns of 300-350 rupees per acre were obtained in the Sambalpur villages with investment costs of only 34 rupees per acre. The contrasting pilot project in Raipur had a much lower profit potential due to high investment costs. The analysis adds support to the proposition that India should spend more public funds on modest improvements in existing flood irrigation systems and much less on large new irrigation projects. (Skogerboe-Colo St)
W77-03062

**EFFECT OF METHOD OF NITROGEN APPLICATION ON CORN (ZEA MAYS L.) GROWN ON IRRIGATED SANDY SOIL,**
Nebraska Univ., Concord. Northeast Station.
G. W. Rehm, and R. A. Wiese.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1217-1220, November-December 1975. 1 fig, 2 tab, 10 ref.

Descriptors: *Nitrogen, *Nutrients, *Fertilizers, Fertilization, *Corn(Field), Crop response, Irrigation, Leaching, Sands.
Identifiers: *Sandy soils.

Studies were conducted in 1970 and 1972 to determine the influence of method of nitrogen application on corn production on irrigated, sandy soils. Conventional preplant and sidedress treatments were compared to situations where either preplant or sidedress applications were supplemented with added N in the irrigation water. Grain yields were recorded and the NO3(-)-N distribution to 150 cm in the soil profile was measured at the end of the growing season. The influence of method of application on corn yields was related to the textural profile of the soil. For a sandy soil with no accumulation of fine textured material, the application of N with the irrigation water increased grain yields. Also, the corn crop recovered a higher proportion of the applied N when some fertilizer N was added with the irrigation water. For a soil type characterized by an accumulation of fine textured material at 50-70 cm below the surface, method of N application had no influence on yield since the downward movement and loss of NO3(-)-N was restricted by the layer of fine-textured material. The data show that the application of a portion of the N fertilizer requirement with the irrigation water should be a recommended practice for corn production on sandy soils having no accumulation of fine-textured material. (Skogerboe-Colo St)
W77-03071

**FERTILIZER OR SALT LEACHING AS AFFECTED BY SURFACE SHAPING AND PLACEMENT OF FERTILIZER AND IRRIGATION WATER,**
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
W. D. Kemper, J. Olsen, and A. Hodgdon.
Soil Science Society of America Proceedings, Vol. 39, No. 1, p 115-119, January-February, 1975. 4 fig, 9 ref.

Descriptors: *Irrigation water, *Furrow irrigation, *Surface irrigation, Fertilization, *Leaching, Root zone, Irrigation effects, Return flow, *Fertilizers, Salts.
Identifiers: *Fertilizer placement.

Irrigation in furrows and placement of fertilizer in bands in ridges was evaluated as a means for allowing overirrigation to bypass nitrate and reduce leaching losses. In a loamy sand, placement of band 0 to 5 cm higher than the surface of water in the furrow allowed over 120 cm of overirrigation

before the salt began to leave the root zone. In the clay loam a similar delay of nitrate removal was not achieved until the band was 10 cm higher than the water surface. This difference appeared to be associated with a perched water table that developed in the 'cultivated' layer of the clay loam soil due to higher hydraulic conductivity in cultivated than in the lower soil. Downward movement of relatively concentrated salt solution near the band, due to its greater density, was a factor that allowed fertilizer bands at lower levels to enter the mainstream of the leaching water. (Skogerboe-Colo St)
W77-03072

**YIELD RESPONSE OF ALFALFA CULTIVARS AND CLONES TO SEVERAL PH LEVELS IN TATUM SUBSOIL,**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
G. R. Buss, J. A. Lutz, Jr, and G. W. Hawkins.
Agronomy Journal, Vol. 67, No. 3, p 331-334, May-June 1975. 5 tab, 8 ref.

Descriptors: *Aluminum, *Alfalfa, *Crop response, Subsoils, Soil investigations, Soil tests, *Hydrogen ion concentration.
Identifiers: *Clones, Tatum subsoils.

Breeding for increased tolerance to high aluminum low pH soils should enlarge the range of adaptation of alfalfa. This research was undertaken to obtain information on the range of genetic variation present in alfalfa cultivars for reaction to soil pH in a high aluminum soil. Eighteen alfalfa cultivars were planted in unlimed (pH 4.4) and limed (pH 6.0) Tatum subsoil. None survived in the unlimed soil and all grew in the limed soil. Clones were selected for root development in unlimed soil after growing down through a 5 cm layer of limed soil. When grown at pH levels of 5.3, 6.1, and 7.5, they showed a highly significant clone X pH interaction for yield. However, on the average they did not seem much more acid tolerant than unselected clones. This screening technique was somewhat successful in isolating acid tolerant clones, but forage yield at low pH appeared to be a better criterion. Results indicate that alfalfa cultivars exhibit a narrower range of acid tolerance than is known to exist in several other crop species, but that individual clones differ in their reaction to both low and high soil pH. It was concluded that sufficient genetic variation exists to permit selection for tolerance to low pH, but the narrow genetic base might limit progress. Also the overall adaptation of selected populations might be somewhat unpredictable because of the clone to pH interaction.
W77-03075

# 4. WATER QUANTITY MANAGEMENT AND CONTROL

## 4A. Control Of Water On The Surface

**PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING, SEPT. - OCT. 1975, (EXECUTIVE SUMMARY).**
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02618

**PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING (SEPT.-OCT. 1975).**
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02619

**LAKE ST. CLAIR BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE,**
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2H.
W77-02675

**EFFECT OF STORAGE ON STORM AND COMBINED SEWERS,**
Toronto Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-02746

**EFFECTS OF SOIL CONSERVATION TREATMENT ON RUNOFF AND SEDIMENT LOSS FROM A CATCHMENT IN SOUTHWESTERN NEW SOUTH WALES, AUSTRALIA,**
Soil Conservation Service of New South Wales, Sydney (Australia). Wagga Research Station.
For primary bibliographic entry see Field 4D.
W77-02772

**OPTIMAL RAINGAGE DENSITIES AND ACCUMULATION TIMES: A DECISION-MAKING PROCEDURE,**
Oklahoma Univ., Norman. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W77-02798

**HYDRODYNAMICS-DISPERSION STUDIES IN STORM SEWERS,**
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 8B.
W77-02827

**ENVIRONMENTAL EVALUATION OF WATER RESOURCES DEVELOPMENT,**
Texas A and M Univ., College Station. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6G.
W77-02828

**THE EFFECTS ON AGRICULTURE IN UTAH OF WATER TRANSFERS TO OIL SHALE DEVELOPMENT,**
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W77-02829

**OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK,**
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 6A.
W77-02831

**WATER QUALITY EFFECT OF DIKING A SHALLOW ARID-REGION LAKE,**
Brigham Young Univ., Provo, Utah.
For primary bibliographic entry see Field 5C.
W77-02871

**EFFECTS OF TREE GROWTH NEAR SMALL WATERWAYS OF MUENSTER ON VEGETATION IN WATER AND ON SLOPES WITH RESPECT TO MAINTENANCE OF THOSE WATERWAYS, (IN GERMAN),**
Bundesanstalt fuer Vegetationskunde, Naturschutz und Landschaftspflege, Bonn-Bad Godesberg (West Germany).
W. Lohmeyer, and A. Krause.
Schriftenr Vegetationskd. 9, p 1-106, 1975.

Descriptors: *Trees, *Plant growth, *Channels, *Grassed waterways, *Streams, *Riparian plants, *Slopes, *Vegetation effects, Maintenance, Inland waterways, Eutrophication, Erosion, Muskrats, Slope stabilization.
Identifiers: Alnus glutinosa, Muenster, West Germany, Westphalia, Ruderal herbs, Alders, Mowing.

Studies were carried out on 200 sections of representative creeks and ditches in north-western Westphalia (Munsterland) (West Germany) to determine how the existence or absence of riparian tree rows affected plant growth in the waterway's profile. Dense shade from the trees surpresses all aquatic and amphibious plant growth. However, full sunlight together with heavy eutrophication produces weed growth below the waterline and dense growth of ruderal herbs on the slopes. The use of mechanical mowers on the waterway's slopes is limited because they initiate erosion and destruction by muskrats. The base of the slopes is only stabilized by deeply rooted alders (Alnus glutinosa), which also prevent abundant growth of grass and herbs in the profile by their dense shade.--Copyright 1975, Biological Abstracts, Inc.
W77-02887

**STUDY OF SANITARY PROBLEMS IN CONNECTION WITH INTER-BASIN TRANSFER OF RIVER RUNOFF, (IN RUSSIAN),**
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W77-02905

**THE EFFECT OF STAND STRUCTURE ON WATER REGIME OF MOUNTAIN SOILS OF THE CARPATHIANS, (IN RUSSIAN),**
All-Union Research Inst. of Soil Erosion Control, Kursk (USSR).
V. N. D'yakov.
Lesovedenie 1, p 11-17, 1976.

Descriptors: *Soil physical properties, *Soil water, Spruce, Soil moisture, Fir trees, Precipitation(Atmospheric), Flow.
Identifiers: Beech, *Carpathians region(USSR), Mountain soils.

Thirty year old beech and beech-spruce stands (in the USSR) are characterized by more favorable soil water and physical properties than spruce monocultures. For 4 hydrological years 83.5% of the precipitation fell in the beech forest; in spruce-beech, 75.2%; and in spruce, 54.8%, with respect to glades. The same tendency is characteristic of soil moistening. The greatest spring surface flow is off the glades and in the spruce stand, the smallest in spruce-beech and fir-beech forests. The surface flow is marked in heavy showers (daily intensity 100-140 mm) in spruce plantations, less in spruce-fir stands.--Copyright 1976, Biological Abstracts, Inc.
W77-02923

**EFFECTS OF FLOOD FLOWS ON WATER QUALITY OF TIOGA-HAMMOND LAKES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02931

**HYDRAULIC CHARACTERISTICS OF RIGOLETS PASS, LOUISIANA, HURRICANE SURGE CONTROL STRUCTURES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02932

**TECHNIQUES FOR REDUCING TURBIDITY ASSOCIATED WITH PRESENT DREDGING PROCEDURES AND OPERATIONS,**
Huston (John), Inc., Corpus Christi, Tex.
For primary bibliographic entry see Field 5G.
W77-02936

**DEVELOPMENT OF NAVIGATION WITH LOCKS AND DAMS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02943

**DESIGN FOR WAVE PROTECTION, FLOOD CONTROL, AND PREVENTION OF SHOALING, CATTARAUGUS CREEK HARBOR, NEW YORK; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02952

**TIOGA OUTLET WORKS, TIOGA AND HAMMOND LAKES, SUSQUEHANNA RIVER BASIN, PENNSYLVANIA; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02956

**WATER QUANTITY REQUIREMENTS FOR PUBLIC SUPPLIES AND OTHER USES,**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-02969

**PRELIMINARY RESULTS OF PREIMPOUNDMENT WATER-QUALITY STUDIES IN THE TIOGA RIVER BASIN, PENNSYLVANIA AND NEW YORK,**
Geological Survey, Harrisburg, Pa. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02977

**MAPPING AND MEASURING LAND-COVER CHARACTERISTICS OF NEW RIVER BASIN, TENNESSEE, USING LANDSAT DIGITAL TAPES,**
Geological Survey, Nashville, Tenn. Water Resources Div.
E. F. Hollyday, and S. P. Sauer.
Water-Resources Investigations 76-106 (open-file report), September 1976. 14 p, 13 fig, 1 tab, 3 ref.

Descriptors: *Land use, *Maps, *Remote sensing, *Satellites(Artificial), *Terrain analysis, Distribution patterns, Strip mines, Coal mines, Land classification, Watersheds(Basins), Sediments, Forests, Data processing, Aerial photography, *Tennessee.
Identifiers: *Cumberland Plateau(Tenn), *Landsat digital tapes.

Land-cover information is needed to select subbasins within the New River basin, Tennessee, for the study of hydrologic processes and is also needed to transfer study results to other sites affected by coal mining. This study demonstrates that digital processing of Landsat tapes can produce maps and tables of the areal extent of selected land-cover categories. The relative area of each category within the basin is agriculture, 5 percent; evergreens, 7 percent; bare earth, 6 percent; three categories of hardwoods, 81 percent; and water, rock, and uncategorized areas, each less than 1 percent. (Woodard-USGS)
W77-02978

**SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 2. BASINS FROM NEW YORK TO DELAWARE.**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02980

**SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME 3. SOUTHERN CENTRAL VALLEY BASINS.**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02981

**DISCHARGE COMPUTATIONS AT RIVER CONTROL STRUCTURES,**
Geological Survey, Jackson, Miss. Water Resources Div.
D. L. Collins.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY7, Paper 12237, p 845-863, July 1976. 10 fig, 5 tab, 3 ref, append.

Descriptors: *Streamflow, *Flow control, *Hydraulic structures, *Flow rates, *Computer programs, Analytical techniques, Dams, Gates, Locks, Spillways, Turbines, Stream gages.
Identifiers: *Streamflow computations, Calibration techniques.

A procedure has been developed by the U.S. Geological Survey to calibrate regulating control structures and determine continuous records of stream-flow on highly-regulated rivers. The hydraulic theory assumes steady unform flow within a computational interval, usually 1 hr. Five different types of control have been analyzed, including tainter gates, turbine wicket gates, fixed or emergency spillways, locks, and crest gates. Field variables recorded include headwater stage, tailwater stage, gate positions, turbine scroll case pressure drops, number of lockages, and number of crest gates open. Instrumentation was developed for monitoring the necessary variables. A generalized software package has been developed to compute the continuous streamflow records at these multipurpose structures by utilizing calibration results and in-situ variables recorded by digital recorders. Two typical calibration procedures showing the general accuracy of the computational methods are presented. (Woodard-USGS)
W77-02986

**CONVECTIVE MODEL OF LONGITUDINAL DISPERSION,**
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02988

**DISPERSION--MISSISSIPPI RIVER BELOW BATON ROUGE, LA.,**
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02989

**INDEX TO WATER RESOURCES DATA FOR ILLINOIS,**
Geological Survey, Champaign, Ill. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02990

**WATER RESOURCES ADMINISTRATION IN VIRGINIA: ANALYSIS AND EVALUATION,**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02996

**THE EFFECT OF RIVER FLUCTUATIONS RESULTING FROM HYDROELECTRIC PEAKING ON SELECTED AQUATIC INVERTEBRATES AND FISH,**
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 5G.
W77-03000

**HYDRAULIC SIMULATION USING DISTRIBUTED PARAMETERS,**
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W77-03001

**WATER HYACINTHS FOR REMOVAL OF CADMIUM AND NICKEL FROM POLLUTED WATERS,**
National Space Technology Labs., Bay St. Louis, Miss.
For primary bibliographic entry see Field 5G.
W77-03041

## 4B. Groundwater Management

**GROUNDWATER POLLUTION BY WOOD WASTE DISPOSAL,**
Oregon State Dept. of Environmental Quality, Salem.
For primary bibliographic entry see Field 5B.
W77-02591

**IMPROVING DESIGN CRITERIA FOR SEPTIC TANK SYSTEMS,**
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-02621

**SUMMARY OF GROUND-WATER QUALITY IMPACTS OF URANIUM MINING AND MILLING IN THE GRANTS MINERAL BELT, NEW MEXICO,**
Office of Radiation Programs, Las Vegas, Nev.
For primary bibliographic entry see Field 5B.
W77-02648

**HEAT AND MASS TRANSFER IN MODELS OF UNDEVELOPED GEOTHERMAL FIELDS,**
Colorado Univ., Boulder. Dept. of Engineering.
D. R. Kassoy.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 123, Price codes: A03 in paper copy, A01 in microfiche. Report NSF-RA-N-75-120, June 16, 1975. 26 p, 5 fig, 1 tab, 9 ref. NSF AER74-03429, NSF GI-44212.

Descriptors: *Geothermal studies, *Model studies, *Heat transfer, *Mass transfer, Convection, Fluid mechanics, Energy transfer, Thermal water, Groundwater, Aquifers, Mathematical models, Viscosity, Temperature, Heat flow, Geophysics.
Identifiers: *Geothermal fields.

A brief summary was given of the nondimensional equations and relevant parameters to be used for describing convection processes in the geothermal setting. Characteristic estimates of flow rates and pressure variation (beyond the hydrostatic value) were given. It was shown that the complete equation system can be reduced in complexity by neglecting terms which describe physically insignificant effects. The resulting equations were used to consider the onset of convection in a horizontal saturated porous slab when a realistic model of

viscosity variation was used. It was shown that the classical constant viscosity prediction is in error both quantitatively and qualitatively. A calculation was made for the rate of convective upflow in a model fault zone. It was shown that under appropriate conditions it is possible to transport as much as 2 - 3 million kg/day up a fault system with a horizontal cross-sectional area of only 0.3 sq km. (Sims-ISWS)
W77-02805

**WATER UNDER THE SAND,**
M. Muller.
New Scientist, Vol. 71, No. 1020, p 702-703, September 30, 1976.

Descriptors: *Sandstones, *Sand aquifers, *Aquifers, *Subsurface waters, *Groundwater resources, Aquifer management, Underground storage, Water sources, Saline water intrusion, Artesian wells, Deserts, Water management, Water resources development, Seepage, Dams, Rivers, Crop production, Irrigation.
Identifiers: *Nubian sandstone.

Subsurface water in the Nile River Valley is a potential water resource, the prospects and problems of its utilization are discussed. Poor drainage is a major problem: without proper drainage much of the newly irrigated land will be unproductive. Increased seepage losses from canal and fields into the subsoil have exceeded the rate at which water can drain to the underlying gravels. The rising water table has brought with it problems of increased saline water intrusion. Tile drainage systems being constructed should cope with the threat posed by shallow ground waters. A major source of subsurface water are the Nubian sandstone aquifers which contain 6000 billion cubic meters of water. The question of whether these waters should be mined is discussed. One proposal is for the creation of a 'New Valley' in the Lybian desert west of the Nile River to link a series of depressions in which artesian springs once flowed from the exposed sandstone aquifer. Studies are being conducted in Egypt to evaluate these projects. At present Egypt has decided to invest resources in drainage projects and small scale investigations of the Nubian sandstones rather than a monumental water project. (Jamail-Arizona)
W77-02852

**FINITE-STATE MODELS OF TRANSPORT PHENOMENA IN HYDROLOGIC SYSTEMS,**
Arizona Univ., Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2F.
W77-02865

**RECORDS OF WELLS AND WATER QUALITY FOR THE GARBER-WELLINGTON AQUIFER, NORTHERN OKLAHOMA AND SOUTHERN LOGAN COUNTIES, OKLAHOMA,**
Geological Survey, Oklahoma City, Okla. Water Resources Div.
J. E. Carr, and J. S. Havens.
Geological Survey open-file report 76-619, September 1976. 32 p, 2 tab, 4 ref.

Descriptors: *Water wells, *Well data, *Water levels, *Water quality, *Oklahoma, Data collections, Water yield, Aquifers, Water users, Chemical analysis.
Identifiers: Northern Oklahoma County(Okla), Southern Logan County(Okla), Garber-Wellington aquifer.

Published and unpublished records are presented for approximately 425 wells in southern Logan and northern Oklahoma counties, Oklahoma. In addition, water-quality data for 72 wells are tabulated, and 4 references to pertinent ground-water reports covering parts of the area are included. (Woodard-USGS)
W77-02974

**AN APPRAISAL OF GROUND WATER FOR IRRIGATION IN THE APPLETON AREA, WEST-CENTRAL MINNESOTA,**
Geological Survey, Reston, Va. Water Resources Div.
S. P. Larson.
Available from Supt. of Documents, GPO, Wash., D.C. 20402, price $2.60. Water-Supply Paper 2039-B, 1976. 34 p, 14 fig, 3 plates, 4 tab, 17 ref.

Descriptors: *Groundwater resources, *Supplemental irrigation, *Water yield, *Water quality, *Aquifer characteristics, Model studies, Mathematical models, Pumping, Drawdown, Groundwater recharge, Streamflow, Base flow, Diversion, *Minnesota.
Identifiers: West-Central Minnesota.

Supplemental irrigation of well-drained sandy soils has prompted an evaluation of ground water in the Appleton area in Minnesota. Glacial drift aquifers are the largest source of ground water. The surficial outwash sand and gravel is the most readily available and the most areally extensive drift aquifer, and it underlies much of the sandy soil area. Saturated thickness of the outwash is more than 80 feet in places, and potential well yields may exceed 1,200 gal/min in some areas. In about 17 percent of the area, yields of more than 300 gal/min are obtainable. Recharge to the outwash aquifer occurs primarily during the spring thaw and averages about 5 inches annually. Most discharge from the aquifer appears as base flow in the Pomme de Terre River. Despite dissolved-solids concentrations ranging from 280 to 1,350 mg/liter, the water is chemically suitable for irrigation. Mathematical models of a part of the aquifer were made to evaluate the effects of 20 successive years of ground-water withdrawal for three irrigation-development patterns. It was estimated that the present annual withdrawal rate of 1,410 acre-ft would result in water-level declines of less than 3 feet. However, annual withdrawals of 8,450 acre-ft would cause aquifer dewatering and decreased well yields in some places. After a new state of equilibrium was established in response to withdrawals, most of the withdrawal would be supplied by diverted base flow from the Pomme de Terre River. (Woodard-USGS)
W77-02982

**WATERLOGGING IN AN ALLUVIAL AQUIFER NEAR LAKE MINNEQUA, PUEBLO, COLORADO,**
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02983

**WATER-RESOURCES DATA FOR DEEP AQUIFERS ON EASTERN MONTANA,**
Geological Survey, Helena, Mont. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02985

**DIGITAL GROUND-WATER MODEL OF THE OGALLALA AQUIFER IN PARTS OF WASHINGTON AND YUMA COUNTIES, NORTHERN HIGH PLAINS OF COLORADO,**
Geological Survey, Lakewood, Colo. Water Resources Div.
G. W. Kapple, R. R. Luckey, and W. E. Hofstra.
Colorado Water Conservation Board, Denver, Colorado Water Resources Circular No 34, 1976. 25 p, 15 fig, 15 ref.

Descriptors: *Groundwater mining, *Model studies, *Pumping, *Irrigation wells, *Drawdown, Forecasting, Digital computers, Mathematical models, Aquifer characteristics, Evaluation, *Computer models, *Colorado, Great Plains.
Identifiers: Northeastern Colorado, *Ogallala formation(Colo).

A finite-difference digital model was developed to simulate the effects of future pumping on a part of the Ogallala aquifer in the northern High Plains of Colorado. The model area covers 768 square miles (1,990 square kilometers) of Washington and Yuma Counties and is the fourth area to be modeled in the northern High Plains project. Ground water in this area is used principally for irrigation and about 215 large-capacity (greater than 100 gallons per minute or 6.3 liters per second) wells were installed through 1973. Calibration of the model was achieved by comparing observed and calculated water-level changes for 1964-73. The calibrated model was used to predict future declines based on extended 1973 pumpage and estimated future pumpages with the hypothetical addition of 107 and 199 wells between 1973-83. These predictions indicate that through the year 2000 saturated thickness would remain greater than 50 feet (15.2 meters) over most of the area. Maximum declines of from 55 to 85 feet (16.8 to 25.9 meters) would occur near Yuma. The model was most sensitive to variations in pumpage and specific yield and least sensitive to transmissivity. (Woodard-USGS)
W77-02991

**MAJOR AQUIFERS IN HAND AND HYDE COUNTIES, SOUTH DAKOTA,**
Geological Survey, Huron, S.D. Water Resources Div.
N. C. Koch.
South Dakota Geological Survey, Vermillion, Information Pamphlet No 14, 1976. 5 p.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water yield, *Water quality, *Water utilization, Water supply, Available water, *South Dakota.
Identifiers: Hand County(S Dak), Hyde County(S Dak).

This information pamphlet describes the general distribution, quantity, and quality of ground water available from the major aquifers in Hand and Hyde Counties, South Dakota. The data were collected by the U.S. Geological Survey and the South Dakota Geological Survey during the period of 1972-75. The Tulare aquifer underlies an area of about 950 sq mi in northern Hand and Hyde Counties. The aquifer may yield as much as 1,000 gpm of water to properly-constructed wells at depths ranging from 10 to 200 ft. Water in the Tulare aquifer is predominantly of calcium bicarbonate or sodium sulfate type with dissolved solids ranging from 200 to 1,800 mg/liter. Water in the Highmore aquifer is predominantly of calcium bicarbonate or sodium sulfate type with dissolved solids ranging from 500 to 2,000 mg/liter. The Highmore aquifer underlies an area of about 100 sq mi in central Hyde County. The aquifer may yield as much as 1,000 gpm of water to properly-constructed wells at depths ranging from 20 to 200 ft. The Elm Creek aquifer underlies an area of 30 sq mi in southwestern Hand County and southeastern Hyde County. The aquifer may yield as much as 1,000 gpm of water to properly-constructed wells at depths ranging 20 to 100 ft. Water in the Elm Creek aquifer is predominantly of calcium bicarbonate or calcium sulfate type with dissolved solids ranging from 500 to 1,000 mg/liter. It is of suitable quality for domestic, stock, municipal, and irrigation use. The Bad-Cheyenne River aquifer underlies an area of about 200 sq mi in Hyde and Hand Counties. The aquifer may yield as much as 1,000 gpm of water to properly-constructed wells at depths ranging mostly from 250 to 330 ft. Water in the Bad-Cheyenne aquifer is of the sodium bicarbonate type with dissolved solids ranging from 1,300 to 1,800 mg/liter. It is of suitable quality for stock and domestic uses. (Woodard-USGS)
W77-02992

## 4C. Effects On Water Of Man's Non-Water Activities

**EFFECTS OF RECREATION ON WATER QUALITY IN WILDLANDS,**
Colorado State Univ., Fort Collins, Colo. Dept. of Recreation Resources.
For primary bibliographic entry see Field 5C.
W77-02590

**BISCAYNE BAY AND ITS ENVIRONS. AN ANALYSIS OF ITS PRESENT AND FUTURE USES FOR METROPOLITAN DADE COUNTY,**
General Oceanics, Inc., Miami, Fla.
For primary bibliographic entry see Field 5G.
W77-02680

**WINTER RUNOFF FROM AN URBAN CATCHMENT, (JANUARY TO MARCH 1974),**
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
D. H. Waller, and W. A. Coulter.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 41, Environmental Protection Service, Environment Canda, Ottawa, Canada, 1974, 50p., 1 app., 7 fig., 16 tab, 11 ref. 74-8-3.

Descriptors: *Snowmelt, *Urban runoff, Drainage water, Winter, Precipitation(Atmospheric), Dusts, Rainfall, Snow, Roads, Suspended solids, *Canada, Watersheds(Basins).
Identifiers: Halifax, Nova Scotia.

Information about winter runoff and snowmelt was obtained for a 163 acre combined sewer drainage area in Halifax, Nova Scotia, from January to March of 1974. Limited amounts of data were obtained for: precipitation; dustfall; snow quantity, quality and density; amount and composition of street solids accumulation and of sand used for ice control; composition of runoff due to snowmelt and rainfall; and, composition and flow rate of dry weather flow and combined sewage. The information obtained is discussed in terms of its application to development or testing of runoff quantity and quality models. (Environment Canada)
W77-02739

**EFFECTS OF MAN ON THE INTERFACE OF THE HYDROLOGICAL CYCLE WITH THE PHYSICAL ENVIRONMENT.**
For primary bibliographic entry see Field 4D.
W77-02771

**EFFECTS OF PULPWOOD HARVESTING ON THE QUALITY OF STREAM WATERS OF FOREST CATCHMENTS REPRESENTING A LARGE AREA IN WESTERN ALBERTA, CANADA,**
Northern Forest Research Center, Edmonton (Alberta).
For primary bibliographic entry see Field 5B.
W77-02774

**NATURAL AND HUMAN INFLUENCE ON THE HYDROLOGICAL CYCLE IN SOUTH INDIA,**
Osmania Univ., Hyderabad (India). Dept. of Geology.
For primary bibliographic entry see Field 4D.
W77-02777

**MAN'S IMPACT ON EROSION IN THE RURAL ENVIRONMENT: THE INDIAN EXPERIENCE,**
International Hydrological Decade, New Delhi (India). Indian National Committee.
V. B. Lal, and S. Banerji.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 46-52, 1974. 1 fig, 3 tab, 13 ref.

Descriptors: *Erosion, *Rural areas, *Watersheds(Basins), Land use, Reservoirs, River systems, History, Planning, Land management, River basin development, Soil conservation.
Identifiers: *India.

Many large-scale engineering works have taken place in India since 1947. These include river valley projects, road networks in border areas, the construction of industrial complexes, and urban expansion. These projects have involved deforestation and an encroachment on the rural environment which have both affected the silt-flow regime in the rivers. In turn, this changed regime has affected canals and reservoirs and caused the meandering of river courses over tracts of land often as much as tens of kilometers wide. The paper gave a brief account of these problems in the Indian experience, and included examples of a few catchments of important river valley projects in India where soil conservation measures on a significant scale had been adopted. The reasons behind the adopted measures were discussed, and an assessment was given of their effectiveness in the short period since their implementation. (See also W77-02771) (Humphreys-ISWS)
W77-02778

**EFFECTS OF MAN'S ACTIVITIES ON EROSION IN RURAL ENVIRONMENTS AND A FEASIBILITY STUDY FOR REHABILITATION,**
Indonesia Univ., Djakarta. Faculty of Technology.
R. S. Partosedono.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 53-56, 1974.

Descriptors: *Erosion, *Rural areas, *Watersheds(Basins), Land use, River systems, River basin development, Irrigation, Reservoirs, Planning, Rehabilitation, River basins.
Identifiers: *Indonesia, *River Cimanuk.

The catchment area of the River Cimanuk is about 3322 sq km, and the length of the River Cimanuk is 180 km. The average rainfall is 1740 mm, and the maximum discharge in the rainy season is about 1300 cu m/s while the minimum discharge is only 1.5 cu m/s in the dry season. The density of foresests in the area is only 21% which the beginning of the World War II decreased by 5%. Deafforestation caused many areas to be very badly eroded, so that excessive sedimentation occurred in the lower reaches and the delta of the River Cimanuk. Annual erosion is 5 mm, and observations of the River Ciluning in the years 1911-1912 and 1934-1935 indicated that an average of 2890 tons/sq km of fertile soil had been removed by flood water. Population increase in the catchment area is 2.3% per annum. Because agricultural productivity is decreasing, many difficulties have arisen including a decrease in the food supply. Hence, people who can no longer produce a living in the area are leaving the basin and moving to several towns in West Java, thereby creating urbanization problems. Processes of erosion and sedimentation as well as the formation of the delta on the shore of the River Cimanuk have made the maintenance of the irrigation system in the basin impossible. (See also W77-02771) (Humphreys-ISWS)
W77-02779

**THE EFFECT OF AFFORESTATION ON EROSION PROCESSES AND SEDIMENT YIELD,**
Institute of Hydrology, Wallingford (England).
R. B. Painter, K. Blyth, J. C. Mosedale, and M. Kelly.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 62-67, 1974. 3 fig, 2 tab, 6 ref.

Descriptors: *Demonstration watersheds, *Erosion, *Sediment yield, Forest watersheds, Reforestation, Model studies, Sediment transport, Small watersheds, Sediments, Measurement, Bank erosion, Gully erosion, Roads, Forests, Bed load, Suspended load.

The effect of coniferous afforestation on erosion processes and sediment yield in upland areas of the United Kingdom is being studied in three experimental basins; one is rough pasture and used for sheep grazing, the second has recently been deep plowed and planted with mixed conifers, while the third is under mature coniferous forest. A proposed model of sediment processes was given. Also, the measurements made of sediment yield, both suspended and bedload, and of erosion from source areas, notably streambanks, gullies, forest roads, forest ditches, and local slips were described. Forest ditching has had an immediate effect on sedimentation giving 1000-fold increases in both suspended sediment concentrations and total yield, compared with the preditching situation. Bedload measurements suggest that even after ditches mature, erosion on steeper slopes produces substantial changes in the supply of material. (See also W77-02771) (Humphreys-ISWS)
W77-02781

**PREDICTION OF EROSION INTENSIFICATION BY MAN,**
Gruzinskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Tiflis (USSR).
Ts. E. Mirtskhoulava.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 78-82, 1974. 2 tab, 5 ref.

Descriptors: *Soil erosion, *Rural areas, *Land use, Slopes, Watersheds(Basins), Forecasting, Vegetation effects, Sediment yield, Equations, Agriculture, Accelerated erosion.
Identifiers: *USSR.

The acceleration of erosion on slopes is normally intensified by man. The optimal planning of agriculture and the rational design of reliable measures to prevent erosion require the amount of soil erosion to be predicted from basic causative factors. It was demonstrated that man's activities occupy an important place among these factors. The paper dealt with a modification of the methods suggested earlier by the author on the basis of investigations carried out in the USA and the USSR. This modification permits the effects of agrotechnical methods and crop rotations to be estimated. (See also W77-02771) (Humphreys-ISWS)
W77-02784

**THE ROLE OF FOREST STANDS IN THE CONTROL OF EROSION PROCESSES AND OTHER NEGATIVE NATURAL PHENOMENA,**
For primary bibliographic entry see Field 4D.
W77-02785

**PREDICTING SEDIMENT YIELD FREQUENCY FOR RURAL BASINS TO DETERMINE MAN'S EFFECT ON LONG-TERM SEDIMENTATION,**
Agricultural Research Service, Temple, Tex.
For primary bibliographic entry see Field 4D.
W77-02786

**SOIL COVER GOVERNS SOIL LOSS ON UNITED STATES CLAYPAN SOILS,**
Agricultural Research Service, Columbia, Mo. North Central Region Watershed Research Center.
For primary bibliographic entry see Field 4D.
W77-02787

**SUSPENDED SEDIMENTS FROM URBAN DEVELOPMENT,**
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
R. G. Warnock, and R. G. Lagoke.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 117-122, 1974. 2 fig, 1 tab, 7 ref.

Descriptors: *Soil erosion, *Cities, *Canada, *On-site investigations, Suspended load, Runoff, Precipitation(Atmospheric), Sediment yield, Vegetation effects, Construction, Community development.
Identifiers: *River Ottawa(Canada).

Urban development is accompanied by construction activity. The vegetative ground cover may be removed, and, as a result, the soil may be exposed to erosion. Precipitation is an active agent of erosion, and it may cause increased erosion in areas under urban development. Some preliminary results were given for research on the increase of suspended sediments in streams draining lands on which urban development is taking place. The study was done in Quebec in the drainage basin of the River Ottawa. It was found that suspended sediment loads in two streams after storm precipitation are correlated to storm precipitation amounts. One of the streams drains a rural area, the other drains an area which is being developed; both of the streams drain approximately the same size area and are near one another. The stream draining the developing area shows two-to-five times as large a suspended sediment load. Data from both stream showed correlation of suspended sediment load with amount of storm precipitation with the data from the developing area showing a considerably better correlation. (See also W77-02771) (Humphreys-ISWS)
W77-02788

**URBANIZATION AND THE PROCESSES OF EROSION AND SEDIMENTATION IN THE RIVER NILE,**
Ain Shams Univ., Cairo (Egypt). Dept. of Engineering.
M. M. Soliman.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 123-126, 1974. 2 fig, 3 ref.

Descriptors: *Urbanization, *Islands, *Rivers, *Sedimentation, Floods, Erosion, Degradation(Slope), Stream stabilization, Dams, Stream erosion, Meanders.
Identifiers: *Egypt, *River Nile, *Cario(Egypt).

The processes of erosion and sedimentation were in a dynamic state along the River Nile and its small islands during flood times. However, after building the High Dam of Aswan, the situation changed and these islands appeared to be in a stable position. The following observations for the River Nile near Cairo were noted: (1) There was very little change of water surface elevation after the High Dam Construction. This may be due to the backwater effect of the Delta Barrage some 25 km north of Cairo, (2) The bed level increased slightly in certain locations, (3) The cross-section shapes are more uniform within the straight reach near the main island, and (4) The suspended sediment concentration is rather higher than expected but much less than that before construction of the dam. It was concluded that a few islands south of Cairo could be used for urban facilities after some river control work has taken place. (See also W77-02771) (Humphreys-ISWS)
W77-02789

**INCREASE OF SEDIMENT TRANSPORT DUE TO LARGE-SCALE URBANIZATION,**
National Research Centre for Disaster Prevention, Tokyo (Japan).
T. Kinosita, and Y. Yamazaki.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 127-129, 1974. 1 tab, 1 ref.

Descriptors: *Urbanization, *Sediment yield, *Surveys, Land development, Suburban areas, Drainage systems, Ponds, Reservoir silting, Land use, Reservoirs, On-site investigations.
Identifiers: *Japan, *Tokyo.

New towns are now under development in the suburbs of Tokyo. Sediment transport due to large-scale urbanization was measured in flood-storage ponds during the period of land development. Average annual sediment transport to the flood-storage ponds from loam and sand layers due to land development construction was 10.4 mm/year per hectare of drainage area. After completion of the pavements, grass cover of the earth surface, and lining of ditches for drainage, the sediment yield tended to zero. (See also W77-02771) (Humphreys - ISWS)
W77-02790

**EFFECT OF THE GROWTH OF THE WEST PART OF MEXICO CITY ON HYDRODYNAMIC PROCESSES (EFFET DE LA CROISSANCE DE LA PARTIE OUEST DE LA VILLE DE MEXICO SUR LES PROCESSUS HYDRODYNAMIQUES),**
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Geografia.
L. E. Maderey.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 130-136, 1974. 7 fig, 1 tab, 4 ref.

Descriptors: *Suspended solids, *Rivers, *Watersheds(Basins), *Mexico, *Runoff, Precipitation(Atmospheric), Discharge(Water), Cities, Vegetation effects, Sediment yield, Rainfall, Hydrologic aspects, Urban runoff, Foreign countries, Land use.
Identifiers: *Mexico City.

There has been a surge in the growth of Mexico City in recent years. As a result, the population of the western part of the City is in danger from water runoff. This paper analyzed the principle hydrological phenomena that have had their equilibrium unbalanced during the period 1961-1971. Some relationships were established, trends were studied, and some deductions were made. In particular, it was concluded that there is little variation between precipitation and runoff and that the suspended sediment is real. Therefore, very careful planning of urban growth was recommended which should take into account the protective influence of vegetation. (See also W77-02771) (Humphreys - ISWS)
W77-02791

**SUSPENDED SEDIMENT PRODUCTION AND BUILDING ACTIVITY IN A SMALL BRITISH BASIN,**
Exeter Univ. (England). Dept. of Geography.
D. E. Walling.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 137-144, 1974. 5 fig, 3 tab, 15 ref.

Descriptors: *Small watersheds, *Urbanization, *Sediment yield, *On-site investigations, Watersheds(Basins), Cities, Suspended load, Sediment discharge, Runoff, Hydrographs, Land development, Land use.
Identifiers: *United Kingdom, Sediment concentration.

A study is being carried out on the influence of building activity on suspended sediment production from a small basin on the margins of Exeter. Records from the period August 1968 to March 1971, when the basin was essentially undisturbed, were used to calibrate its response and to assess the changes that occurred during 1973 when 25% of its area was influenced by building activity. On average, sediment concentrations have increased 5 fold and sediment loads 5 to 10 fold. (See also W77-02771) (Humphreys - ISWS)
W77-02792

**EFFECT OF LAND DEVELOPMENT ON SOIL EROSION AND SEDIMENT CONCENTRATION IN AN URBANIZING BASIN,**
Parsons, Brinckerhoff, Quade and Douglas, Inc., New York.
C-N. Chen.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 150-157, 1974. 4 fig, 2 tab, 9 ref.

Descriptors: *Urbanization, *Land development, *Sediment yield, *District of Columbia, *Maryland, Cities, Land use, Soil erosion, Construction, Watersheds(Basins), Sedimentation rates, Runoff, Sediment discharge.
Identifiers: Sediment concentration.

Based upon data collected from drainage basins in the metropolitan regions of Washington, D.C. and Baltimore, the soil erosion rates from construction sites and non-construction lands were determined. The gross soil erosion from an urbanizing basin, with various percentages of area undergoing construction, was then evaluated on the basis of the erosion rates from (1) non-construction lands, (2) construction sites without erosion control, and (3) construction sites with different levels of on-site control practices. With regard to sediment runoff in the stream, a functional relationship was established to correlate the sediment concentrations with (1) the soil erosion rates from construction sites, (2) the percentage of basin area undergoing construction, (3) the sediment delivery ratio of the basin, and (4) the direct runoff in the stream. The quantitative information established in this study provides a tool to assess the potential impact of both controlled and uncontrolled land development on soil erosion and sediment concentration in an urbanizing basin. Furthermore, the information can be used as a guide in setting criteria for erosion control practices in terms of soil-loss limits from construction sites and/or sediment concentrations in streams. (See also W77-02771) (Humphreys - ISWS)
W77-02793

**A RECONNAISSANCE OF THE EFFECTS OF A FOREST FIRE ON WATER QUALITY IN KINGS CANYON NATIONAL PARK, CALIFORNIA,**
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02973

**LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION; APPLICATION OF THREE-DIMENSIONAL HYDRODYNAMIC MODEL TO STUDY EFFECTS OF PROPOSED JETPORT ISLAND ON THERMOCLINE STRUCTURE IN LAKE ERIE,**
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Earth Sciences.
For primary bibliographic entry see Field 2H.
W77-02994

**IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA,**
California Univ., Berkeley. School of Forestry and Conservation.
J. R. McBride.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 077, Price codes: A02 in paper copy, A01 in microfiche. California Water Resources Center, Davis, Completion Report, September 1976. 16 p, 7 fig, 3 tab, 5 ref. (California Water Resources Center Project UCAL-WRC-W-445). OWRT A-049-CAL(1).

Descriptors: *Urbanization, *Watersheds(Basins), *Sediment yield, *Flood peak, *Water quality, *Water yield, *California, Watershed management.
Identifiers: Berkeley Hills(Calif), Urban watershed.

The objective was to determine the impact of urbanization on the hydrologic characteristics of watersheds in the Berkeley Hills of central California. The initial approach was to calibrate three stream gaging stations prior to the development of one watershed above one of these stations and to follow changes in hydrologic characteristics during and subsequent to development. Economic and political developments in 1974 and 1975 prevented the developer from building on the principal watershed. A summary of data on annual water yield, characteristics of flood peaks, sediment yield, and water quality for the three non-urban watersheds is presented. A subproject completed during the study compared periodicity of streamflow in previously urbanized and non-urbanized watersheds in the Berkeley Hills. Two daily discharge peaks which lagged 1.5 hours behind two daily peaks in lawn irrigation were observed. Peak daily streamflow on the urbanized watershed was 10 times that of a similar non-urbanized watershed. The stream from the urbanized watershed ceased flowing from late July until mid-October. (Snyder-California, Davis)
W77-02999

## 4D. Watershed Protection

**URBAN HYDROLOGICAL MODELING AND CATCHMENT RESEARCH IN CANADA,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2A.
W77-02754

**URBAN DRAINAGE MODEL COMPARISON FOR A CATCHMENT IN HALIFAX, NOVA SCOTIA,**
Nova Scotia Technical Coll., Halifax.
For primary bibliographic entry see Field 2A.
W77-02764

**EFFECTS OF MAN ON THE INTERFACE OF THE HYDROLOGICAL CYCLE WITH THE PHYSICAL ENVIRONMENT.**
Proceedings of Paris Symposium, September 1974: International Association of Hydrological Sciences, Publication No 113, 1974. 164 p.

Descriptors: *Conferences, *Soil erosion, *Sediment yield, *Urbanization, *Rural areas, Land development, Land use, Watersheds(Basins), Small watersheds, Cities, Runoff, Vegetation effects, Erosion control, Forecasting.

The effects of man's activities on soil erosion in rural and urban areas were discussed. The subject areas covered included: land use, land development, soil cover, soil conservation treatment, sediment yield, sediment loads in rivers, urbanization effects, and evaluation techniques. (See W74-13215; W75-05916; W75-07880; and W77-02772 thru W77-02793) (Humphreys-ISWS)
W77-02771

**EFFECTS OF SOIL CONSERVATION TREATMENT ON RUNOFF AND SEDIMENT LOSS FROM A CATCHMENT IN SOUTHWESTERN NEW SOUTH WALES, AUSTRALIA,**
Soil Conservation Service of New South Wales, Sydney (Australia). Wagga Research Station.
C. M. Adamson.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 3-14, 1974. 6 fig, 5 tab, 4 ref.

Descriptors: *Soil conservation, *Land management, *Demonstration watersheds, Watersheds(Basins), Sediment control, Rainfall, Runoff, Land reclamation, Soil erosion, On-site investigations, Hydrographs, Data collections, Hydrologic data, Flow duration.
Identifiers: *Australia, *New South Wales.

The effects of completely treating one catchment with soil conservation practices were compared with another similar catchment on which no improvements have been undertaken. The effects of soil conservation structures combined with improved land management practices resulted in significant hydrological changes in the treated catchment, namely: (1) Overall reductions in runoff and soil loss have occurred. The overall reduction in runoff is 74% while sediment losses have been reduced by 99%, (2) Much of the reduction in runoff is attributed to the contour furrows which restrict overland flow and increase depression storage, (3) Effects are greatest in years with below average-to-average rainfall. When above average rainfalls are recorded, annual yields of runoff increase but soil losses do not increase proportionately, (4) During storms, the greatest reduction in runoff occurs for the earliest part of the storm. With increasing depths of precipitation, the effect of runoff reduction is less. Eventually, rate of runoff may exceed that from the untreated catchment, (5) Base flows commence at higher discharges and have lower recession values than do base flows from the untreated catchment, and (6) Carrying capacity and pasture production are greatest for the treated catchment. (See also W77-02771) (Humphreys-ISWS)
W77-02772

**THE EROSION INDEX AS A FACTOR FOR DETERMINING TURBIDITY IN RIVERS (L'INDICE D'EROSION-FACTEUR DE DETERMINATION DE LA TURBIDITE DES RIVIERES),**
For primary bibliographic entry see Field 2J.
W77-02773

**EFFECTS OF PULPWOOD HARVESTING ON THE QUALITY OF STREAM WATERS OF FOREST CATCHMENTS REPRESENTING A LARGE AREA IN WESTERN ALBERTA, CANADA,**
Northern Forest Research Center, Edmonton (Alberta).
For primary bibliographic entry see Field 5B.
W77-02774

**PLANT COVER AND SEDIMENT TRANSPORTATION IN THE RIVER BASIN OF THE SEINE (LA COUVERTURE VEGETALE ET LES DEBITS SOLIDES DES COURS D'EAU DANS LE BASSIN DE LA SEINE),**
For primary bibliographic entry see Field 2J.
W77-02775

**THE EFFECT OF AGRICULTURE ON THE SURROUNDINGS OF LAKE BALATON,**
University of Agriculture, Keszthely (Hungary).
For primary bibliographic entry see Field 5B.
W77-02776

**NATURAL AND HUMAN INFLUENCE ON THE HYDROLOGICAL CYCLE IN SOUTH INDIA,**
Osmania Univ., Hyderabad (India). Dept. of Geology.
Y. Janardan Rao, B. E. Vijayam, and J. S. V. L. Narasimham.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 40-45, 1974. 1 fig, 1 tab, 10 ref.

Descriptors: *Hydrologic cycle, *Watersheds(Basins), *Geology, *Geomorphology, Agriculture, Drainage, Reservoirs, Urbanization, History, Rainfall, Hydrogeology, Runoff, Irrigation.
Identifiers: *India.

South India falls largely in the semiarid zone except for the western coast. The paper discussed the varying physiographical and geological regimes in this region in relation to the hydrological cycle. The effects of human activities such as agricultue, drainage, reservoir construction, and urbanization on the erosion patterns and on surface and groundwater resources were briefly described. A comparison was made of different drainage basins in South India in relation to their hydrological and hydrogeological aspects. (See also W77-02771) (Humphreys-ISWS)
W77-02777

**MAN'S IMPACT ON EROSION IN THE RURAL ENVIRONMENT: THE INDIAN EXPERIENCE,**
International Hydrological Decade, New Delhi (India). Indian National Committee.
For primary bibliographic entry see Field 4C.
W77-02778

**EFFECTS OF MAN'S ACTIVITIES ON EROSION IN RURAL ENVIRONMENTS AND A FEASIBILITY STUDY FOR REHABILITATION,**
Indonesia Univ., Djakarta. Faculty of Technology.
For primary bibliographic entry see Field 4C.
W77-02779

**EROSION PHENOMENA IN DRAINAGE BASINS REFLECTED BY SEDIMENT FLOW IN RIVERS (PHENOMENES D'EROSION DES BASSINS VERSANTS REFLETES PAR LES TRANSPORTS SOLIDES DES COURS D'EAU),**
Institutul de Meteorologie si Hidrologie, Bucharest (Rumania).
For primary bibliographic entry see Field 2J.
W77-02780

**THE EFFECT OF AFFORESTATION ON EROSION PROCESSES AND SEDIMENT YIELD,**
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 4C.
W77-02781

**APPROACHES TO CONTROLLING EROSION IN RURAL AREAS,**
Strathclyde Univ., Glasgow (Scotland). Dept. of Civil Engineering.

G. Fleming.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 68-72, 1974. 12 ref.

Descriptors: *Erosion control, *Rural areas, *Reviews, Vegetation establishment, Erosion, Sediment transport, Sediment control, Planning, Land use, Conservation, Adoption of practices, Land management.

The intensive utilization of rural areas for the settlement of expanding populations and for the increased production of food and timber can lead to acute sediment erosion problems when careful planning is not implemented. The conservation of soil resources, while at the same time permitting their maximum development for man, calls for research which integrates all the factors relating to the sediment problem in entire basins, followed by the application of research knowledge at the local and regional level. Considerable experience already exists on practical measures which may be used to control erosion, including vegetation management, land use, and physical control structures. To be effective, conservation measures must be based on an understanding of all factors involved, human as well as physical. (See also W77-02771) (Humphreys-ISWS)
W77-02782

**WATER EROSION AND SEDIMENT DISCHARGE,**
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2J.
W77-02783

**PREDICTION OF EROSION INTENSIFICATION BY MAN,**
Gruzinskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Tiflis (USSR).
For primary bibliographic entry see Field 4C.
W77-02784

**THE ROLE OF FOREST STANDS IN THE CONTROL OF EROSION PROCESSES AND OTHER NEGATIVE NATURAL PHENOMENA,**
V. T. Nikolayenko.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 83-86, 1974.

Descriptors: *Erosion control, *Forests, *Water quality, Water pollution, Watersheds(Basins), Runoff, Trees, Reservoirs, Rivers, Vegetation effects, Slope protection, Potable water, Sediments.
Identifiers: *USSR.

Long-term observations and studies to determine the protective functions of tree shrub vegetation revealed the important role that vegetation plays in the removal of sediment from runoff. As a result of many years observation (Moscow region), it has been established that a 30 m wide strip almost entirely arrests sediment from treeless, arable slopes of length 190-200 m and gradient of 3 deg. Extensive investigations showed that forest stands could prevent or reduce to a significant extent bank abrasion of rivers, reservoirs, and other bodies of water which causes great damage to the economy. It was also shown that forest improves many properties of water such as color, transparency, and even taste. After passing through a forest stand, water is purified from ammonia, alkali, and other noxious substances. Numerous experiments revealed one more beneficial feature of forest - it retains not only chemically harmful substances, but also microbes which are very dangerous to human life. Experiments conducted in various regions of the country (Moscow, Orel, Penza, and elsewhere) showed that after having passed through a 30-40 m wide forest strip, the number of microbes in the water was reduced by a factor of 2 or more. (See also W77-02771) (Humphreys-ISWS)
W77-02785

**PREDICTING SEDIMENT YIELD FREQUENCY FOR RURAL BASINS TO DETERMINE MAN'S EFFECT ON LONG-TERM SEDIMENTATION,**
Agricultural Research Service, Temple, Tex.
J. R. Williams.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 105-108, 1974. 2 tab, 5 ref.

Descriptors: *Sediment yield, *Watersheds(Basins), *Iowa, *Nebraska, *Texas, Rural areas, Forecasting, Small watersheds, Frequency curves, Runoff, Erosion control, Soil erosion, Soil types, Land management, Sedimentation, Sediment discharge, Land use, Floods.
Identifiers: Erosion index, Universal soil loss equation.

Long-term sediment yields were used to determine man's effect on sedimentation in a rural environment. Sediment yields for floods of five different frequencies were computed using modified universal soil loss equation to determine a sediment frequency curve. The universal equation was modified by replacing the rainfall energy factor with a runoff rate and volume factor for basin application. Runoff frequency curves used in determining sediment frequency can be obtained from runoff measurements or computed with mathematical models. Man's effect on sediment yield is expressed by the cropping management and the erosion-control-practice factors of the universal equation. The long-term effect can be determined for any particular land use and management system by computing a sediment yield frequency curve with appropriate values of the cropping management and erosion-control-practice factors. The area under the sediment frequency curve is used to obtain the average annual sediment yield, and the slope of the curve indicates the variation in individual storm sediment yields. Since only five different storms are needed to define the sediment frequency curve, many alternative land use and mangement systems can be considered. The procedure is useful in planning land use and management practces for large rural basins. (See also W77-02771) (Humphreys-ISWS)
W77-02786

**SOIL COVER GOVERNS SOIL LOSS ON UNITED STATES CLAYPAN SOILS,**
Agricultural Research Service, Columbia, Mo. North Central Region Watershed Research Center.
H. G. Heinemann, and F. D. Whitaker.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 109-113, 1974. 3 fig, 5 ref.

Descriptors: *Soil erosion, *Erosion control, *Land use, *Land management, On-site investigations, Hardpan, Clays, Soil management, Cultivated lands, Vegetation effects, Corn(Field), Cultivation, Soil conservation.
Identifiers: Claypan soils.

Soil surveys before 1936 showed that midwestern farmers had lost about 17.5 cm (about one-half) of the original topsoil from the sloping claypan soils in about 70 years of clean-till farming. Production declined rapidly with continued removal of nutrients and topsoil in runoff. Early research showed that the use of adequate fertilzer and good residue management practices were helpful in reducing soil loss except during extremely wet seasons. Soil loss in 1969 from areas sown with corn continuously and grown with previously 'acceptable practices' was 143 tonnes/ha. Most of the soil loss occurred when the soil cover was inadequate. Research (1954-1973) showed that leaving about 50% of the previous crop's residue on the soil surface at planting reduced soil loss to less than one-half that from conventional (clean-tilled) seedbeds. The average annual loss for the 20-year period was 2.69 and 6.05 tonnes/ha, respectively. Research (1970-1973) showed that no-till planting techniques in which corn is planted directly through the previous crop's residue, or in a cover crop, reduced soil loss to about one-eighth that of conventionally tilled corn. The average annual losses were 1.28 and 9.75 tonnes/ha, respectively. Corn yields were nearly equal from all treatments. (See also W77-02771) (Humphreys-ISWS)
W77-02787

**SUSPENDED SEDIMENTS FROM URBAN DEVELOPMENT,**
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02788

**URBANIZATION AND THE PROCESSES OF EROSION AND SEDIMENTATION IN THE RIVER NILE,**
Ain Shams Univ., Cairo (Egypt). Dept. of Engineering.
For primary bibliographic entry see Field 4C.
W77-02789

**INCREASE OF SEDIMENT TRANSPORT DUE TO LARGE-SCALE URBANIZATION,**
National Research Centre for Disaster Prevention, Tokyo (Japan).
For primary bibliographic entry see Field 4C.
W77-02790

**EFFECT OF THE GROWTH OF THE WEST PART OF MEXICO CITY ON HYDRODYNAMIC PROCESSES (EFFET DE LA CROISSANCE DE LA PARTIE OUEST DE LA VILLE DE MEXICO SUR LES PROCESSUS HYDRODYNAMIQUES),**
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Geografia.
For primary bibliographic entry see Field 4C.
W77-02791

**SUSPENDED SEDIMENT PRODUCTION AND BUILDING ACTIVITY IN A SMALL BRITISH BASIN,**
Exeter Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 4C.
W77-02792

**EFFECT OF LAND DEVELOPMENT ON SOIL EROSION AND SEDIMENT CONCENTRATION IN AN URBANIZING BASIN,**
Parsons, Brinckerhoff, Quade and Douglas, Inc., New York.
For primary bibliographic entry see Field 4C.
W77-02793

**A NOTE ON EFFICACY OF VEGETATIVE COVERS AND SLOPES ON RUNOFF AND FERTILITY LOSSES IN A SEMI-ARID TRACT OF RAJASTHAN,**
S. K. N. Coll. of Agriculture, Jobner (India).
M. R. Bajpai, R. G. Gujar, and G. Singh.
Annals of Arid Zone, Vol. 14, No. 4., p 376-378, December, 1975.

Descriptors: *Slopes, *Slope stabilization, *Slope protection, *Soil erosion, *Erosion control, Soil chemical properties, *Vegetation establishment, Vegetation, Plants, Runoff, Fertility, Soil types, Soil properties, Nutrients, Infiltration, Monsoons, Interception, Erosion, Degradation(Slope), Regime.
Identifiers: Rajasthan, *India.

The effect of erosion on sandy and sandy loam soils in areas with steep slopes was investigated. A field experiment was conducted during the monsoon season to determine the effects of heavy rainfall upon these slopes and the efficiency of various types of vegetation cover in preventing erosion. Runoff, soil losses, fertility losses and infiltration rate are reported. The increase in runoff with increasing slope may be due to greater water velocity: falling rain drops find less time for absorption. Greater soil and water losses were recorded from the bare plots as compared to those covered with vegetation which intercepts raindrops' impact and provides obstruction to the flow of water. Increase in slope reduced the organic carbon and nitrogen content of the soil as fine particles were washed away. Levelled plots gave slightly better infiltration as compared to plots on slopes, but the difference was not significant. (Jamail-Arizona)
W77-02856

**SAMPLING AND ANALYSIS OF STORM-WATER RUNOFF FROM URBAN AND SEMI-URBAN/RURAL WATERSHEDS - SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES,**
Purdue Univ., Lafayette, Ind. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W77-02995

**HYDRAULIC SIMULATION USING DISTRIBUTED PARAMETERS,**
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W77-03001

# 5. WATER QUALITY MANAGEMENT AND PROTECTION

## 5A. Identification Of Pollutants

**DETERMINATION OF MONOHYDRIC LOW-MOLECULAR PHENOLS IN SPENT LIQUORS AND PULP MILL EFFLUENTS (BADANIA NAD OZNACZANIEM JEDNOWODOROTLENOWYCH NISKOCZASTECZKOWYCH ZWIAZKOW FENOLOWYCH W LUGACH I SCIEKACH Z CELULOZOWNI),**
B. Pszonka.
Przeglad Papierniczy, Vol. 32, No. 7, p 237-242, July, 1976. 2 fig, 41 ref, 2 tab.

Descriptors: *Pulp wastes, *Phenols, *Gas chromatography, *Pollutant identification, Wastes, Industrial wastes, Water pollution sources, Analytical techniques, Separation techniques, Organic compounds, *Waste identification, Effluents.
Identifiers: *Kraft mills.

A description is given of a method for separating monohydric phenols from kraft mill effluents. The gas chromatographic method was developed on the basis of preliminary experiments with known mixtures of mono-, di-, and trihydric phenols, using various solid and stationary liquid phases for the separation of free phenols, their methyl ethers, and their acetates. The best separation was obtained in columns with 15% silicone oil SE-30 on Gas Chrom Q 80/100 mesh. The di- and trihydric phenol could be separated only after conversion of the ethers (acetates were less well suited), but the determination errors were great, and further studies are needed for the development of a better procedure. Monohydric phenols (phenol, cresols, xylenols, and chlorophenols) could be separated and identified in the presence of nontoxic phenolic compounds (guaiacol, acetovanillone, acetosyringone) with an accuracy of 5%. The application of this method to effluents from 4 kraft mills (black liquors, evaporator condensates, and overall effluents before and after purification) showed a phenol composition similar qualitatively but different quantitatively in all samples. A comparison with the results of determinations by the standard 4-aminoantipyrine method confirmed the assumption that the content of toxic phenols is much lower than the content of total phenols as determined by the standard method. (Stapinski-IPC)
W77-02579

**METHOD FOR DETERMINATION OF GLYPHOSATE RESIDUES IN NATURAL WATERS BASED ON POLAROGRAPHY OF THE N-NITROSO DERIVATIVE,**
Norges Landbrukshoegskole, Vollebekk. Chemical Research Lab.
J. O. Bronstad, and H. O. Friestad.
The Analyst, Vol 101, No 1207, p 820-824, October 1976. 4 fig, 9 ref.

Descriptors: *Water analysis, *Pollutant identification, *Polarographic analysis, *Herbicides, Water pollution sources, Trace elements, Natural streams, Chromatography, Anion exchange, Nitrogen compounds, Analytical techniques, Water chemistry, Water properties.
Identifiers: Glyphosate, N-phosphonomethylglycine.

A differential-pulse polarographic method for the determination of residues of glyphosate (N-phosphonomethylglycine) herbicide in natural waters down to 35 micrograms/liter is described. The material is concentrated by chromatography on an anion-exchange column, which at the same time performs the sole purification required. A polarographically active glyphosate derivative is obtained by nitrosation performed directly in a fraction of the eluate from the column. The precision in terms of relative standard deviation varies from 22.8% at the detection limit to 2.3% at 210 micrograms/liter. The total analysis time for one sample is 3-4 hr. (Witt-IPC)
W77-02582

**AUTOMATION OF TOTAL PHENOLIC CONTENT DETERMINATION WITH THE FOLIN-CIOCALTEU REAGENT. APPLICATION TO THE STUDY OF WASTE WATERS FROM FIBERBOARD MILLS (AUTOMATISATION DE LA METHODE DE DOSAGE DES COMPOSES PHENOLIQUES TOTAUX PAR LE REACTIF DE FOLIN-CIOCALTEU. APPLICATION A L'ETUDE DES EAUX RESIDUAIRES DES USINES DE PANNEAUX DE FIBRES DE BOIS),**
Institut National de la Recherche Agronomique, Dijon (France). Technologie.
G. Albagnac, J. Sarris, J-N. Morfaux, and A. Djian.
Industries Alimentaires et Agricoles, Vol 92, No 9/10, p 1047-1053, 1975. 3 fig, 8 ref, 3 tab.

Descriptors: *Pulp wastes, *Phenols, *Water analysis, Colorimetry, Automation, Wastes, Industrial wastes, Water pollution sources, Analytical techniques, *Water reuse, *Recycling, Organic compounds, Aromatic compounds, Chemical analysis, *Pollutant identification, Effluents.
Identifiers: Folin-Ciocalteau reagent, Board mills, Insulation boards, Hardboards, Hot-pressed boards.

Colorimetric determination of total phenolics with the Folin-Ciocalteu reagent was automated using a continuous flow analyzer, and applied to the monitoring of waste water from a fiberboard mill. Data are presented concerning the influence of waste water recycling and of modifications of various manufacturing conditions (pressing temperature and platen-press schedule) on total phenolic levels. (Speckhard-IPC)
W77-02584

**GRAPHICAL INTERPRETATION OF WATER QUALITY DATA,**
Mississippi State Univ., Mississippi State. Dept. of Civil Engineering.
J. L. Mahloch.
Water Air Soil Pollut. 3(2), p 217-236, 1974.

Descriptors: *Water quality, *Data collections, Pollutant identification, *Graphical methods, Analytical techniques, Water pollution, Data processing.

Management of water resources through planning and control of water pollution hinges on the availability and interpretation of water quality data on which to base management decisions. Graphical methods are explored which allow rapid and informative analysis of water quality data. The graphical methods fall into 2 main categories. The 1st category relates to graphical procedures which are developed as part of a statistical test, such as discriminant analysis. The 2nd category involves approximation of multivariate water quality data into 2 dimensions. The methods for accomplishing the latter are canonical decomposition and high-dimensional plotting. Each of these methods is developed and used on an example set of data to demonstrate their utility. These methods not only present a graphical representation of the data, but also explain variations and interrelationships within the data itself.--Copyright 1975, Biological Abstracts, Inc.
W77-02592

**COMPARATIVE METHYLATION CHEMISTRY OF PLATINUM, PALLADIUM, LEAD, AND MANGANESE,**
California Univ., Livermore. Lawrence Livermore Lab.
R. T. Taylor.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 553, Price codes: A03 in paper copy, A01 in microfiche. Report EPA-600/1-76-016, March 1976. 25 p., 5 tab., 11 fig., 14 ref.

Descriptors: *Biochemistry, *Metals, *Lead, *Manganese, *Toxicity, Vitamins, Metabolism, Transportation, Chemical wastes, Fuels, Gasoline, *Public health, Mammals, *Air pollution, Air pollution effects, Human diseases, Aquatic environment.
Identifiers: *Platinum, *Palladium, *Methylation(Biochemical), Fuel additives, Automotive fuels, Catalytic control devices, Methylcobalamin, Platinum 4+, Mammalian cells.

A study was carried out to evaluate the potential for platinum, palladium, lead, and manganese salts and oxides to be biochemically methylated. Methylation is an important, well recognized, determinant of metal toxicity; the striking example being the extreme health hazard of methylated mercury. The possible biological methylation of the metals which are associated with emissions arising from the use of automotive fuels, fuel additives, and catalytic control devices is of special concern to the Environmental Protection Agency's Catalyst Research Program. Salts of platinum, palladium, and lead, and oxides of lead all containing the metal in a 4+ valence were observed to demethylate methylcobalamin, a biologically active form of vitamin B-12. Inorganic salts and oxides of manganese were unreactive. No evidence for a stable monomethyl-metal derivative was found using palladium and lead compounds as reactants. However, salts of platinum 4+ do result in the formation of stable methylation products.

The reaction product formed from methylcobalamin and hexachloroplatinate was shown definitively to be a monomethyl-platinum compound. It is sufficiently stable in aqueous solutions under a variety of conditons to exist in freshwater ecosystems and to exhibit toxic effects on mammalian cells. (Katz)
W77-02623

**PESTICIDE RESIDUE ANALYSIS IN WATER (103.1), TRAINING MANUAL,**
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Program Operations.
P. F. Hallbach.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-238 072, Price codes: A13 in paper copy, A01 in microfiche. Report EPA-430/1-74-012, September 1974. 425 p., 26 tab., 46 fig., 125 ref.

Descriptors: *Methodology, *Water chemistry, *Water quality, Gas chromatography, Public Health, Instrumentation, *Pesticides, *Waste identification, *Environment, Environmental control, *Aquatic environment, *Chemical analysis, Infrared radiation, Sampling, *Organochlorine pesticides, *Organophos-phorous pesticides, Industrial effluents, *Pesticide residues, Pollutant identification.
Identifiers: Infrared spectroscopy, Pesticide residue analysis, *Training manuals.

Training manual contains outlines of course material for the conduct of a training course in pesticide residue analysis. Includes an introduction to pesticide residue analysis and progresses into advanced use of the gas chromatograph. (Katz)
W77-02624

**TRACE HYDROCARBON ANALYSIS: THE NATIONAL BUREAU OF STANDARDS, PRINCE WILLIAM SOUND/NORTHEASTERN GULF OF ALASKA, BASELINE STUDY,**
National Bureau of Standards, Washington, D. C. Analytical Chemistry Div.
S. N. Chesler, B. H. Gump, S. H. Hertz,, W. E. Dyszel, and D. P. Enagonio.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 538, Price codes: A05 in paper copy, A01 in microfiche. NBS Technical Note 889, January 1976. 66 p., 4 tab., 24 fig., 18 ref.

Descriptors: *Oil, *Oil pollution, Gas chromatography, Mass spectrometry, *Baseline studies, *Analytical methods, *Pacific Ocean, Water pollution, *Alaska, Mussels, Mytilus, Sediment, Benthic fauna, Methodology, Monitoring, *Organic compounds, Pollutant identification.
Identifiers: Liquid chromatography, Petroleum analysis, *Trace hydrocarbon analysis, Volatile hydrocarbons, Benzpyrenes, *Gulf of Alaska, *Prince William Sound(Alaska).

The low concentration of hydrocarbons anticipated in pollution baseline studies necessitates the development of analytical techniques sensitive at the sub-microgram per kilogram concentration level. The method of analysis developed in this laboratory involves dynamic headspace sampling for volatile hydrocarbon components of the sample followed by coupled-column liquid chromatography for the non-volatile components. These techniques require minimal sample handling, reducing the risk of sample component loss and/or sample contamination. Volatile sample components are separated from the matrix in a closed system and concentrated on a TENAX-GC packed pre-column, free from large amounts of solvent and ready for GC/GC-MS analysis. Non-volatile compounds, such as the benzpyrenes, may be extracted from large volumes of water and concentrated on a Bondapak C18 packed pre-column for coupled-column liquid chromatographic separation and analysis. Results of the application of these techniques are presented and discussed. (Katz)
W77-02628

**CADMIUM IN THE ENVIRONMENT - III: A TOXICOLOGICAL AND EPIDEMIOLOGICAL APPRAISAL,**
Karolinska Institutet, Stockholm (Sweden).
For primary bibliographic entry see Field 5B.
W77-02633

**MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. CHROMIUM.**
National Research Council, Washington, D.C. Committee on Biologic Effects of Atmospheric Pollutants.
For primary bibliographic entry see Field 5C.
W77-02635

**COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. V, MONITORING PROGRAM CAPABILITY, DESCRIPTOR TABLES,**
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02641

**COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES. VOLUME II, DIRECTORY OF STATE TOXIC SUBSTANCES MONITORING AGENCIES,**
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02642

**SAMPLING AND ANALYSIS OF SELECTED TOXIC SUBSTANCES. TASK II-ETHYLENE DIBROMIDE,**
Midwest Research Inst., Kansas City. Mo.
J. Going, and S. Long.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 213, Price codes: A03 in paper copy, A01 in microfiche. Report EPA-560/6-75-001, September 1975. 30 p, 5 tab, 10 fig, 11 ref.

Descriptors: *Monitoring, *Organic compounds, *Chemical analysis, *Bromine, Halogens, *Water pollution, *Air pollution, *Path of pollutants, *Pollutant identification, Public health, Industrial wastes, *Sampling, *Bromides.
Identifiers: *Ethylene dibromide, Potential carcinogen, *Pesticide, *Fumigant, Retail gasoline station, Oil refinery, Ambient air level.

Ethylene dibromide has recently been reported by the NCI to be a potential carcinogen. Its commercial use is predominantly as a scavenging agent for lead in gasoline. A minor usage is a pesticide fumigant. A protocol was developed for the sampling and analysis of ethylene dibromide in ambient air and surface water. The range in concentration of ethylene dibromide in the air and the site where it was collected are as follows: manufacturing sites, 4.2 to 115 micrograms/M3; oil refinery, 0.23-1.65 micrograms/M3; urban locations near retail gasoline stations and with heavy vehicular traffic, 0.069 to 0.11 micrograms/M3. Two water samples collected from streams near an oil refinery and a manufacturing site were found to contain 1.13 and 1.05 ppb ethylene dibromide, respectively. Further work to clarify ambient air levels and to assess whether they may represent a health risk is anticipated, but the very low levels detected to date are not thought to present a significant risk to health. (Katz)
W77-02644

**NOAA'S ACTIVITIES IN ENERGY RELATED MEASUREMENT AND MONITORING,**
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 5G.
W77-02652

**WATER MEASUREMENT AND MONITORING IN ENERGY DEVELOPING AREAS,**
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5G.
W77-02653

**SCANNING THERMAL PLUMES,**
Wisconsin Univ., Madison. Marine Studies Center.
F. L. Scarpace, R. P. Madding, and T. Green, III.
Sea Grant College Reprint No. WIS-SG-76-362, Reprinted from: Photogrammetric Engineering and Remote Sensing, Vol 41, no. 10, p 1223-1232, October 1975. 17 fig, 2 tab, 5 ref.

Descriptors: *Powerplants, *Thermal pollution, *Water pollution, *Wisconsin, *Lake Michigan, Thermal plumes, Temperature, *Pollutant identification, *Remote sensing, Path of pollutants.
Identifiers: *Temperature gradient, Airborne thermal scanners, Scanners, Ground truth data.

Thermal plumes associated with the condenser cooling of power plants despite their small size are difficult to characterize. Over 800 thermal line scans of power plant plumes taken during the past three years indicated that their mixing with the nearshore lake water is extremely complex and highly dependent on envrionment conditions. A cooperative effort to monitor all thermal plumes along the Wisconsin shore of Lake Michigan has been undertaken. Since December 1972, thermal line scans of all the major power plants in the State of Wisconsin have been acquired on a twice weekly basis. An overview of the techniques used at the University of Wisconsin for analyzing thermal scanner data as applied to the imagery from the Point Beach power plant at Two Creeks, Wisconsin (on Lake Michigan) is described. (NOAA)
W77-02682

**CONCENTRATIONS AND CONCENTRATION FACTORS OF HEAVY METALS IN BROWN ALGAE,**
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
P. Foster.
Environmental Pollution, Vol. 10, p. 45-53, 1976. 1 fig., 4 tab., 15 ref.

Descriptors: *Absorption, Algae, *Heavy metals, *Phaeophyta, Zinc, Copper, Nickel, Manganese, *Bioindicators, *Trace elements, Cadmium, Lead, Chromium, Monitoring, Analytical techniques, Environmental effects, *Marine algae, *Pollutant identification.
Identifiers: Bioaccumulation, *Fucus sp., *Ascophyllum sp., *Menai Straits.

Concentrations and concentration factors of zinc, copper, manganese, and nickel in Fucus vesiculosus and Ascophyllum nodosum collected from the Menai Straits are presented. Temporal variations in dissolved trace metal concentrations to which these algae are exposed have been intensively monitored for several years. Algal concentrations are compared with those of similar samples taken from a highly polluted area. Both species are recommended as potential biological indicators for copper. F. vesiculosus is more sensitive to increases in the mean ambient dissolved concentrations of zinc. For neither species does a direct relationship exist between concentrations of iron and manganese in the weeds and water. Algal concentrations of cadmium, lead and chromium are also discussed. In highly polluted environments algal concentrations of minor elements do not reflect the water concentrations to which they have been exposed. (Katz)
W77-02698

**TOXICITY OF THE SURGEON FISHES-II PROPERTIES OF THE PRINCIPAL WATER SOLUBLE TOXIN,**
Tohoku Univ., Sendai (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 5C.
W77-02700

**PHYTOPLANKTON PRODUCTION MEASUREMENTS WITH CARBON-14 WITH CONSIDERATION OF LABELED ORGANIC MATTER LOSSES DURING FILTRATION, (IN RUSSIAN),**
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
V. V. Bul'on.
Okeanologiya 15(3), p 503-507, 1975.

Descriptors: *Phytoplankton, *Plankton, *Carbon filters, Filtration, Coasts, Oxidation, Photosynthesis, Photosynthetic oxygen, *Primary productivity, *Organic matter, Asia, Pollutant identification.
Identifiers: *Carbon-14, Organic matter, Losses, Permanganate, Plankton radioactivity.

Plankton primary production was determined by the 14C method at 9 stations in the coastal waters of eastern Asia. Losses of labeled organic matter during filtration of the samples were as great as 49% of the assimilated C. The major part of the lost photosynthetic product was represented by chemically stable compounds because oxidation with permanganate was only 10-40% of that of the more effective photooxidation method. The inverse relationship between plankton radioactivity on the filters and the duration of filtration indicates that the appearance of photosynthetic products on the filters is primarily a consequence of mechanical damage of phytoplankton cells during filtration.--Copyright 1976, Biological Abstracts, Inc.
W77-02704

**TOXICITY OF WATER-SOLUBLE FRACTIONS OF FOUR TEST OILS FOR THE POLYCHAETOUS ANNELIDS, NEANTHES ARENACEODENTATA AND CAPITELLA CAPITATA,**
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-02716

**A SEQUENTIAL APPROACH TO THE COUNTING OF PLANKTON ORGANISMS,**
Pavia Univ. (Italy).
For primary bibliographic entry see Field 7B.
W77-02721

**DETERMINATION OF SMALL AMOUNTS OF MERCURY,**
Kodak (Australasia) Pty Ltd., Coburg (Australia). Research Labs.
S. Chilov.
Talanta. 22(3), p 205-232, 1975.

Descriptors: *Mercury, *Pollutant identification, Trace elements, Analytical techniques, Emission spectroscopy, Polargraphic analysis, Colorimetry, Chromatography, X-ray analysis.

Since analysis for trace amounts of Hg is most often carried out on environmental samples (tissue, water, air) most methods of analysis will enccunter at least some interference as well as being dependent on preliminary digestion to bring Hg into solution in the desired form. The following techniques and their advantages and disadvantages are discussed: X-ray fluorescence, spectrographic emission, electrochemistry (polarography), colorimetry, atomic fluorescence, radiochemistry, neutron activation, isotope dilution, chromatography, conventional atomic absorption and its flameless and cold vapor modifications, concentration by amalgamation and sample combustion.--Copyright 1975, Biological Abstracts, Inc.
W77-02729

**METHODS OF INVESTIGATING PHYTOBENTHOS OF CONTINENTAL WATER BODIES, (IN RUSSIAN),**
Akademiya Nauk SSSR, Novosibirsk. Central Siberian Botanical Garden.
G. D. Levadnaya.
Gidrobiol Zh 11(3); p 85-90, 1975.

Descriptors: *Benthos, *Biomass, *Algae, *Aquatic algae, Chlorophyll, Bodies of water, Bottom sediments, Silts, Sands, Cytological studies, *Pollutant identification.
Identifiers: *Phytobenthos, USSR, Ob River, Enisei River.

A review is given of the literature on methods of quantitative evaluation of the biomass of algae, which can be expressed in dry, air-dry, ashless-dry and fresh weight; in the content of chlorophyll and biogenic elements; and in calories. The most convenient method of recording the biomass on soft bottom deposits (silts, silty sands) is the count-volume method: algae collected from a known area of the bottom are counted and knowing the average weight of the dominant species, the total biomass is determined. Data are given on the average weight of cells of the main forms of algae (24 spp.) of the Ob and Enisei rivers (USSR).--Copyright 1976, Biological Abstracts, Inc.
W77-02742

**INSTRUMENTATION FOR FIELD STUDIES OF URBAN RUNOFF,**
Canada Centre for Inland Waters, Burlington (Ontario).
J. Marsalek.
Canada-Ontario Agreement on Great Lakes Water Quality, Research Report No. 42, Environmental Protection Service, Environment Canada, Ottawa, Canada, 1974, 82p., 27 fig., 7 tab, 36 ref,. 1 append. 73-3-12.

Descriptors: *Instrumentation, *Urban runoff, Precipitation(Atmospheric), Sewage, Waste water treatment, Flow, Sampling, Gauges, Measurement, *Monitoring, Pollutant identification, Water pollution sources.
Identifiers: Sensors, Recorders.

Instrumentation and monitoring techniques for field studies of urban runoff are examined. In particular, the following types of instruments were studied: recording precipitation gauges; sewer flow measurement instruments; and, automatic wastewater samplers. After reviewing the literature and surveying the market, some of the promising instruments were acquired, tested in the laboratory and operated in the field for various time periods. Individual instruments are discussed with regard to their technical data, accuracy and reliability. Recommendations for the selection, interfacing and installation of the instruments are given. (Environment Canada)
W77-02749

**LEVELS OF ARSENIC AND SELENIUM IN THE GREAT LAKES REGION,**
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
W. J. Traversy, P. D. Goulden, Y. M. Sheikh, and J. R. Leacock.
Water Quality Branch, Scientific Series No 58, 1975. 18 p, 8 fig, 17 tab, 29 ref.

Descriptors: *Great Lakes, *Arsenicals(Pesticides), Industrial wastes, Water pollution, *Great Lakes Region, Rivers, Lakes, Water analysis, Sediments, Fish, Fallout, Rain, Toxins, Sampling, *Pollutant identification, Water pollution sources.
Identifiers: *Arsenic, *Selenium.

Arsenic and selenium were determined in water, sediments and fish samples from the international Great Lakes, in water samples from international rivers and selected rivers in Ontario and in precipitation samples from the Great Lakes region, to assess their present levels and to provide base-line data for future reference. Mean values for arsenic in lake waters varied from 0.23 micro g/l for Lake Superior to 0.91 micro g/l for Lake Ontario, and mean sediment values ranged from 2.03 micro g/g for Lake Superior to 3.20 micro g/g for Lake Erie. The mean arsenic fish value for lakes Erie and Ontario was 0.07 micro g/g. Analyses of waters from the St. Marys and St Lawrence rivers showed mean arsenic values of 0.37 micro g/l and 0.61 micro g/l, respectively, and the mean value of other rivers in Ontario was 0.26 micro g/l. The mean precipitation arsenic value was 0.72 micro g/l. Mean selenium values for lake waters were less than 0.1 micro g/l for all of the Great Lakes and mean sediment values ranged from 0.63 micro g/g for Lake Superior to 1.00 micro g/g for Lake Ontario. Mean fish values from lakes Erie and Ontario were 0.05 micro g/g and 0.06 micro g/g, respectively. The St. Marys and St. Lawrence rivers showed mean selenium values of less than 0.1 micro g/l, as did other rivers tested in Ontario. The mean precipitation selenium value was 0.29 micro g/l. (Environment Canada)
W77-02751

**ASBESTIFORM FIBRE LEVELS IN LAKES SUPERIOR AND HURON,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W77-02753

**COMPUTERIZED SCHEME FOR THE IDENTIFICATION OF AEROMONADS AND MEMBERS OF THE FAMILY ENTEROBACTERIACEAE,**
Canada Centre for Inland Waters, Burlington (Ontario).
W. E. Lowe.
Inland Waters Directorate Scientific Series No. 57, 1975, 33p., 2 fig., 7 tab, 31 ref., 2 append.

Descriptors: *Aeromonads, *Enteric bacteria, Classification, Computers, Aquatic bacteria, Mathematical models, Methodology, Testing, *Computer programs, Coliforms, *Pollutant identification.
Identifiers: *Enterobacteriaceae.

A system is described which combines practical and theoretical concepts into a workable system for the routine and simultaneous identification of large numbers of Aeromonas isolates and members of the Family Enterobacteriaceae. The identification method is based on computerized determination of conditional probabilities of two-state characters, using estimations of likelihood rather than Bayesian probability. The multipoint inoculation procedures used, coupled with small quantities of media in non-disposable racks and vials reduce the costs considerably below those of commercially available multi-test single inoculation systems. The reliability of the system, determined for a range of hospital isolates, approaches 90 percent, and with isolates from water the accuracy approaches 100 percent. (Environment Canada)
W77-02758

**STUDY OF THE SOLUBILITY OF OIL IN WATER,**
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
B. C. Y. Lu, and J. Polak.
Technology Development Report EPS-4-EC-76-1, Environmental Protection Service, Environment Canada, Ottawa, Canada, February 1976, 25 p., 10 fig., 11 tab., 11 ref.

Descriptors: *Oil, *Water analysis, *Oil-water interfaces, Solubility, Fuels, Time, Pollutant identification, Oil wastes.
Identifiers: Bunker oil, Crude oil, Removal rates(Oil).

Experiments were conducted to determine the total solubility of oil in water. Three oils were employed; Number 2 fuel oil, medium bunker fuel, and western crude oil. The total solubilities of these oils were determined by dissolution tests and by static equilibrium tests; both testing procedures attained similar results. The maximum solubilities and the lengths of time in which these were attained were of the following orders of magnitude; Number 2 fuel oil, 7.5 ppm, attained in 5 days; medium bunker fuel, 2.3 ppm, attained in 2 days; and western crude oil, 46 ppm, attained in 8 days. The rates of removal of the dissolved components from solution in water were also investigated. The time duration of removal was analagous to the time duration for the attainment of maximum concentration. Traces of soluble hydrocarbons were found to persist for at least 13 days after their introduction into solution. (Environment Canada)
W77-02765

**PROCEDURE FOR EXAMINATION OF WATER AND SEDIMENT SAMPLES FOR TOTAL ASBESTOS FIBRE COUNT BY ELECTRON MICROSCOPY,**
Canada Centre for Inland Waters, Burlington (Ontario).
M. R. Thompson.
Inland Waters Directorated Technical Bulletin No. 94, 1976, 4 p., 2 fig., 1 tab., 9 ref.

Descriptors: *Asbestos, *Water analysis, *Sediments, *Electron microscopy, *Lake Superior, Sampling, Lakes, Equipment, *Pollutant identification.
Identifiers: *Fibers(Asbestos), Fibre count(Asbestos).

In 1973, a major investigation of asbestos fibers in water and sediment samples of Lake Superior began at Canada Centre for Inland Waters. A procedure for obtaining total fibers per litre of water samples was developed. This report documents that procedure, describing problems encountered and suggested solutions, and outlining the mathematical equations for determining fibers per litre. (Environment Canada)
W77-02766

**POLYCHLORINATED BIPHENYLS (PCB'S) IN MUNICIPAL WASTEWATERS: AN ASSESSMENT OF THE PROBLEM IN THE CANADIAN LOWER GREAT LAKES,**
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
E. E. Shannon, F. J. Ludwig, and I. Valdmanis.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 49, 1976, 28 p., 4 fig., 5 tab., 17 ref., append. 73-3-8.

Descriptors: *Polychlorinated biphenyls, *Municipal wastes, Waste water treatment, Sewage treatment, Aroclors, Sludge, Degradation(Decomposition), Cities, Industries, Aquatic environment, Canada, Separation techniques, Pollutant identification.
Identifiers: Ontario, Physical separation.

A survey of polychlorinated biphenyls (PCB's) concentrations in the raw wastewaters from 33 municipalities was carried out. In addition, detailed investigations of the fate of PCB's during conventional secondary treatment were performed at the Hamilton Wastewater Treatment Plant. PCB concentrations in raw wastewaters ranged from less than 0.1 to 1.8 ppb, with the industrial areas of Hamilton, Toronto and Windsor exhibiting the highest levels. Only the 1254 and 1260 Aroclors were detected in any of the wastewaters. The primary treatment facilities surveyed removed, on the average 50% of the PCB load, whereas the secondary plants averaged 66% removal. PCB concentrations in digested sludges ranged from 0.6 to 76.6 ppm (dry weight). PCB removal during wastewater treatment is largely by accumulation in the primary and/or waste activated sludge streams. There seemed to be little biodegradation. There are indications that multiple-hearth incineration may destroy the PCB's encountered in dewatered sludges. However, more experimental work is necessary to substantiate this observation. (Environment Canada)
W77-02768

**ACID PRECIPITATION,**
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
For primary bibliographic entry see Field 2B.
W77-02800

**APPLICATIONS OF DIRECT AQUEOUS INJECTION GAS CHROMATOGRAPHY AND FREEZE CONCENTRATION FOR THE DETERMINATION OF ORGANIC COMPOUNDS IN WATER AND WASTE WATERS,**
Canada Centre for Inland Waters, Burlington (Ontario).
M. E. Fox.
American Society for Testing and Materials Special Technical Publication 573, p. 242-250, 1975. 6 fig., 1 tab., 9 ref.

Descriptors: *Organic compounds, *Analytical techniques, *Gas chromotography, Pollutants, Sewage effluents, Water pollution, *Pollutant identification, Water analysis.

The successful analysis of methanol and aircraft deicer (a 2:1 mixture of ethylene glycol plus propylene glycol with traces of other compounds) in wastewater and a preliminary attempt to analyze a pulp mill effluent plume in a water body are described. To detect methanol in sewage to less than 1 ppm, a porous polymer column packing material was chosen; when the column temperature was lowered to 70C the water response appeared as a very low flat-topped mound with the methanol appearing as a normal sharp peak on top of the mound. The duration of the water response for a 5 microliter injection was about 50-60 seconds and the low molecular weight organic compounds could be differentiated from methanol retention times. Higher molecular weight compounds were either retained in the removable injection port liner or eluted so slowly that significant baseline deflections were noted, thus producing results with little sample pretreatment, a speed of 50+ samples/hr, and sufficient precision. The aircraft deicer was analyzed at a 160C column temperature, when the two major components eluted together as a single peak, and could be reported as mgC/l. Freezing to offset the dilution of an organic effluent plume was limited to achievement of no more than a 15 X concentration due to high levels of inorganic salts. (Auen-Wisconsin)
W77-02809

**A METHOD FOR THE DETERMINATION OF MERCURY IN SEDIMENTS BY THE AUTOMATED COLD VAPOR ATOMIC ABSORPTION TECHNIQUE AFTER DIGESTION,**
Canada Centre for Inland Waters, Burlington (Ontario).
H. Agemian, and A. S. Y. Chau.
Analytica Chimica Acta, Vol. 75, p. 297-304, 1975. 2 fig., 2 tab., 25 ref.

Descriptors: *Mercury, *Analytical techniques, Sediment-water interfaces, Digestion, *Pollutant identification, Methodology, *Sediments.
Identifiers: Cold vapor mercury analysis, Atomic absorption techniques.

In order to determine the mercury content of a sample it is necessary to extract the inorganic mercury and to liberate mercury from organomercurials by oxidation of the organic matter because all forms of mercury introduced into the aqueous environment end up adsorbed on fine-grained particles, such as iron oxides, sulfide surfaces and on clay particles, and to be present as inorganic phosphorus complexes, in humate complexes, and as methyl- and dimethyl-mercury produced by microbial activity. A manual method for the extraction of inorganic mercury and the oxidation of organomercurials has been modified and incorporated into an automated procedure for the determination of mercury in sediments. The method includes digestion of the wet sediment with sulfuric and nitric acids followed by oxidation of the organomercurials with potassium permanganate and potassium persulfate. Errors caused by coprecipitation and adsorption of mercury on manganese dioxide are avoided by reduction of the dioxide with a solution of hydroxyammonium sulfate and sodium chloride. The mercury content in solution is determined by a cold vapor technique with tin(II) sulfate as a reductant in an automated system. This method can detect down to 10 ppb of mercury in sediment (based on 1 g samples) and can automatically handle 20 samples per hour after manual digestion. (Auen-Wisconsin)
W77-02811

**NEW AUTOMATED COLORIMETRIC METHOD FOR THE DETERMINATION OF CHLORIDE USING CHROMOTROPIC ACID,**
Canada Centre for Inland Waters, Burlington (Ontario).
B. K. Afghan, R. Leung, A. V. Kulkarni, and J. F. Ryan.
Analytical Chemistry, Vol. 47, p. 556-559, 1975. 4 fig., 1 tab., 9 ref.

Descriptors: *Chlorides, *Analytical techniques, *Colorimetry, Measurement, *Pollutant identification, Water analysis.

Under the experimental condition used during formaldehyde analysis, chloride ion catalyzed the conversion of nitrate to nitrite and the resultant nitrite reacted with chromotropic acid to produce strongly colored species. This triggered the development of a colorimetric method for chloride measurement in water in the range of 0.25-100 mg/l at the rate of 20 samples per hour. Variation of temperature and time of color development have a pronounced effect on the intensity of color production by the reaction of chloride, nitrate, and chromotropic acid. A maximum sensitivity was achieved using 25 mg/l of nitrate at 75C in a working range between 0.25-30 mg/l, but the range of calibration curve can be altered to cover a 1-100 mg/l range. The optimum concentration of chromotropic acid required to analyze chloride in the 1-100 mg/l range was 0.25%. No major and minor ions, or organic compounds normally found in water produced interference. All absorption measurements were carried out using a 505-nm narrow pass filter making it possible to cover a chloride concentration range between 0.25-100 mg/l. This method can be directly applied to the analysis of natural waters and possibly to waste waters. (Auen-Wisconsin)
W77-02812

**CONCENTRATIONS OF COPPER, IRON, LEAD, NICKEL AND ZINC IN FRESHWATER ALGAL BLOOMS,**
University Coll. of Swansea (Wales). Dept. of Botany and Microbiology.
D. R. Trollope, and B. Evans.
Environmental Pollution, Vol. 11, p. 109-116, 1976. 3 tab., 18 ref.

Descriptors: *Heavy metals, *Bioassay, *Algae, Absorption, Copper, Iron, Lead, Nickel, Zinc, Europe, Monitoring, Chlorophyta, Cyanophyta, Pollutant identification.
Identifiers: *Lower Swansea Valley(England), Bioconcentration, Xanthophyta.

The ability of freshwater algae to absorb and concentrate heavy metals was measured near zinc smelting wastes in the Lower Swansea Valley, England. The majority of the algae were filamentous and all were Chlorophyta except Tribonema (Xanthophyta) and Oscillatoria (Cyanophyta). Metal concentrations in algal tissue varied with genus and within a genus, e.g., the four Tribonema blooms exhibited three- to fourfold differences for copper, iron and lead and in the four Spirogyra concentrations varied from fivefold to twentyfold for all five metals. The large differences in the range of concentration factors exhibited within each algae group were apparent for all metals except lead where tenfold differences were present in the three algal groups. For zinc there was a linear correlation between water concentration and algal concentration. It was unclear whether differences observed for the other metals were due to differences in environmental conditions or to differences due to the nature of the algae. However, an examination of the four Tribonema blooms showed that their variation in metal content was likely due to a combination of environmental factors and the age of the algae. It may be possible to utilize freshwater algae as an assay tool for heavy metal concentrations as these algae are ubiquitous and some species tolerate wide variations in environmental conditions. (Auen-Wisconsin)
W77-02813

**REX, A COMPUTER CONTROLLED ROBOT FOR IN SITU WATER QUALITY MONITORING,**
Canada Centre for Inland Waters, Burlington (Ontario).
K. N. Birch.
American Society for Testing and Materials Special Technical Publication 573, p. 437-455, 1975. 6 fig., 1 tab., 8 ref.

Descriptors: *On-site data collections, *Water quality, *Monitoring, *Automatic control, Digital computers, Equipment, *Computer programs, Analytical techniques, *Pollutant identification.
Identifiers: Sensors, Robots.

A prototype computer controlled monitoring system using a relatively simple sensing head capable of performing a repertoire of analytical experiments in situ is described. The robot sensing head is the active portion of the remote station and includes all the electronic and mechanical hardware to decode and execute the commands from the computer. The sensing head was tested using an EAI 690 hybrid computer to simulate a central computer and telecommunications facility. The head consisted of a peristaltic pump, a servo positioned valve, an array of six electrodes (2 glass pH, 3 silver-silver chloride, and 1 gold micro-electrode) and a thermistor, along with buffer amplifiers and motor controllers to service these devices. A main feature is its design as a remote, computer peripheral, like a teletype, which understands up to 64 different commands, and which returns coded responses. Its in situ orientation makes the entire sensor head submersible and operable in depths to 100 m. A repertoire of programmed experiments showed how it could monitor temperature, pH, conductivity, dissolved oxygen, chloride ion, total carbon dioxide, total alkalinity, and a factor identified as 'other ions.' The system configuration is illustrated by a block diagram. Using the computer as the master control element is the major aspect of the system. (Auen-Wisconsin)
W77-02814

**PROBLEMS IN THE MONITORING OF BIOMASS,**
Canada Centre for Inland Waters, Burlington (Ontario).
N. H. F. Watson, G. F. Carpenter, and M. Munawar.
American Society for Testing and Materials, Special Technical Publication 573, p. 311-319, 1975. 4 fig., 1 tab., 11 ref.

Descriptors: *Measurement, *Biomass, *Sampling, Standing crops, Seston, Bioassay, Testing procedures, *Monitoring, Pollutant identification.

An effective approach to produce adequate biomass measures and which reports data in biomass as well as in numerical units is suggested. The method involves taking pairs of samples at each station, one as a vertical haul with a plankton net of sufficient diameter and length to ensure efficient straining of the water column; the second made to the same depth with an integrating water sampler. Integrated samples have been obtained to a 20 m depth. Measured portions of both samples are filtered on fiberglass (large zooplankton are removed from integrator filters), dried in a dessicator, and analyzed for ash-free dry weight or particulate carbon. A fraction of the integrator samples is passed through a sieve of the same mesh size as the plankton net, and each fraction dried to estimate net and nannoplankton concentrations. Biomass is expressed as concentrations (per cubic meter), although net and integrator dimensions allow calculation of areal abundance (per square meter) unit as well. Addition of the nannoplankton values to the plankton net biomass gives total biomass, and subtraction of net phytoplankton values from the plankton net value produces a zooplankton biomass value. This procedure assures that a sufficiently large sample is taken to overcome the effects of horizontal and vertical microdistribution of planktonic organisms and subsampling and analysis procedures allow absolute values of total biomass to be obtained. (Auen-Wisconsin)
W77-02818

**HETEROGENEOUS SENSITIZED DECOMPOSITION OF WATER WITH SUNLIGHT,**
Exxon Research and Engineering Co., Linden, N.J.
For primary bibliographic entry see Field 2K.
W77-02819

**TROPHIC CLASSIFICATION OF LAKES USING LANDSAT-1 (ERTS-1) MULTISPECTRAL SCANNER DATA,**
Environmental Research Lab., Corvallis, Oreg.
D. H. P. Boland.
EPA-600/3-76-037. April, 1976. 244 p. 38 fig., 33 tab., 211 ref., 18 append. NAS7-100 EZ-608770.

Descriptors: *Trophic level, *Remote sensing, *Satellites(Artificial), *Eutrophication, Photometry, Spectroscopy, Surveys, Statistical methods, Regression analysis, Lakes, Limnology, Great Lakes region, Pollutant identification, Classification.
Identifiers: *Lake classification, *Multispectral scanning, Cluster analysis, LANDSAT, Earth Resources Technology Satellite(ERTS).

LANDSAT-1 (ERTS-1) multispectral scanning data of 100 lakes in Minnesota, Wisconsin, Michigan and New York was evaluated. Principal components analysis was used to derive a multivariate trophic state index using six trophic indicators. Trophic state, defined in the study by lake position on the index, is predicted using multispectral scanning color regression statistical models. Utility of the scanning technique is most apparent when the seasonal contrasts between lakes at different points on the trophic scale are at maximum. It is concluded that remote sensing by earth satellite can be used to provide much useful data in trophic classification studies of lakes. Maximum benefit from the satellites can be derived through use of the data on their computer-compatible tapes in conjunction with automatic image processing techniques. While remote sensing is an effective tool for lake enumeration and lake surface area estimation, systematic time-series data gathering is difficult if not impossible because of excessive cloud cover on many passover dates. However, the method is useful as a supplemental data source in lake surveying, especially in situations involving large lakes and/or large numbers of lakes. (Harris-Wisconsin)
W77-02825

**ENVIRONMENTAL INVENTORY AND ASSESSMENT OF NAVIGATION POOLS 24, 25, 26, UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS: AN AQUATIC ANALYSIS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
W. K. Colbert, J. H. Johnson, J. E. Scott, and R. C. Solomon.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A 021 750, Price codes: A16 in paper copy, A01 in microfiche. Report No. Y-75-2, December 1975. 368 p. 33 fig., 35 tab., 4 maps, 95 ref., 10 append.

Descriptors: *Mississippi River, *Basic data collections, *Sampling, *Monitoring, *Water quality, Aquatic habitats, Environmental effects, Dams, Dikes, Dredging, Channel improvement, Operation and maintenance, Sediments, Turbidity, Phenols, Heavy metals, Nutrients, Temperature, Suspended solids, Alkalinity, Chemical oxygen demand, Benthos, Fish, Hydrogen ion concentration, Dissolved oxygen, Phytoplankton, Zooplankton, Chlorinated hydrocarbon pesticides, Navigation, Census.
Identifiers: *Illinois River, Navigation Pool 24, Navigation Pool 25, Navigation Pool 26.

Physical, chemical, and biological components of the aquatic system in Pools 24, 25, and 26 on the Upper Mississippi and Lower Illinois Rivers are described and compared at high and average flow periods, and the effects of operation and maintenance of the 9 ft channel on the aquatic ecosystems were assessed. Four major habitat types, main channel, side channel, river border areas, and areas downstream of dikes, were sampled, consisting of 70 sites at 19 transects. Water and sediment samples were collected for physical and chemical characterization. In situ measurements were made for dissolved oxygen, temperature, total alkalinity, pH, turbidity, and settleable solids. Laboratory analyses were made for chemical oxygen demand, phenols, heavy metals, selected nutrients, and chlorinated hydrocarbons. Benthic organisms, drift organisms, phytoplankton, and zooplankton were collected from both rivers, but fish were only collected from the Illinois River. Variance and mean comparison statistical analyses were used to test for differences between flow periods, rivers, and among habitats. The environmental impacts of operation and maintenance activities such as the stabilization of the water levels, destruction of benthic communities by dredging, and disposal of dredge material alongside the channel, was also discussed. (Luedtke-Wisconsin)
W77-02826

**THE CAPACITY OF SALT MARSH VEGETATION TO MODIFY THE QUALITY OF ESTUARINE WATERS,**
Rhode Island Univ., Kingston. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2L.
W77-02830

**PAPERS OF A SEMINAR ON EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES, CONFERENCE REPORT,**
Battelle Memorial Inst., Seattle, Wash.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 412, Price codes: A18 in paper copy, A01 in microfiche. Report No. EPA-560/1-75-003, July 1975. Seminar held on January 30-February 1, 1974, Seattle, Washington. 215 p. 68-01-2108.

Descriptors: *Forecasting, *Toxicity, *Toxins, *Public health, *Environmental effects, *Epidemiology, Poisons, Simulation analysis, Chemical wastes, Projections, Industrial wastes, Estimating, Organic compounds, Indicators, Water quality, Analysis, Water pollution effects, Evaluation, Air pollution, Chemical industry, Diseases, Industrial plants, Monitoring, Systems analysis, Social aspects, Analytical techniques, Trace elements, Legal aspects, Legisltion, Human pathology, Path of pollutants, Tracking techniques, Marking techniques, Tracers, Cost-benefit analysis, Decision making.
Identifiers: *Public health screening, *Early warning systems, *Disease detection, *Disease screening, *Priority ranking techniques, *Problem identification and ranking, Evaluation systems, Prioritization systems, Research strategis, Research methods, Toxic Substances Control Act, Consumer products and pollution, Radiolabeling, Teratology, Cost-risk benefit analysis, Carcinogenic chemicals, Evaluation, Synthetic chemical compounds, Environmental stressors, Public interest groups, Intuitive methods.

Seventeen papers are described, the proceedings of a three-day seminar held early in 1974 to examine some of the tools that currently exist for the early identification, assessment and prioritization of chemical substances which impact adversely on man or his environment. Participants represented a cross section of organizations concerned with early warning systems, including U. S. government agencies, private industry, research institutes, universities, public interest groups, international agencies and various scientific disciplines. Hazardous and potentially-hazardous substances targeted for discussion included such toxic metals, chemicals, and organic compounds as mercury, lead, thalidomide, polychlorinated biphenyls, vinyl chlorides, fuel additives and ketones. Various methodologies are discussed by which toxic substance early warning systems can be conceptualized, organized and utilized by industry, the government and the scientific sector. The relationships between water pollution effects and certain toxic substances are discussed in some papers. Public health screening, disease detection/disease screening and research strategies are covered. Specific epidemiologic effects are discussed in relation to certain agents and communicative pathways. (See W77-02836 thru W77-02850) (Harris-Wisconsin).
W77-02835

**ENVIRONMENTAL IMPACT OF CHEMICALS,**
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 5G.
W77-02836

**ENVIRONMENTAL STRESSOR MATRIX SYSTEM FOR EARLY WARNING,**
Battelle Columbus Labs., Ohio.
D. L. Morrison.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 175-195. 7 fig., 3 tab., 8 ref.

Descriptors: *Warning systems, *Analytical techniques, *Environmental effects, *Toxins, *Toxicity, Poisons, Public health, Monitoring, Systems analysis, Hazards, Pollutant identification, Path of pollutants, Chemicals.
Identifiers: *Evaluation systems, *Environmental stressors, Disease detection, Public health screening.

Framework description is given of the three basic elements of an early warning system for identification of toxic substances: surveillance, assessment and action. The system deals with environmental stressors--the agents or factors of concern reduced to their simplest terms or their most fundamental unit. Examples are specific ketones, biphenyls, halides and oxides among the organic chemical compounds, along with noise, radiation, inhalants, foods and bacteria among the biological and physical environmental stress. An environmental stressor matrix traces an agent from its several sources along all its environmental pathways through various receptors to determine its effect on man. The environmental stressor matrix arrays stressors against sources, transport paths, and effects classifications. Surveillance is used to identify hazards by monitoring toxicants on the market, screening technical literature and comparing partial results at scientific meetings. Assessment attempts to verify that cause and effect relationships exist and a valid pollution chain diagram can be constructed to deal with a given stressor. As part of this step, quantitative modeling provides problem magnitude estimation. Finally, action implies corrective activities by industry, government and the scientific community. (See also W77-02835) (Harris-Wisconsin)
W77-02837

**AN INCIDENT OF INDUSTRIALLY RELATED TOXIC PERIPHERAL NEUROPATHY,**
National Inst. for Occupational Safety and Health, Cincinnati, Ohio.
B. F. Craft.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 45-50. 4 ref.

Descriptors: *Industrial plants, *Epidemiology, Diseases, Human pathology, Toxicity, Toxins, Public health, Poisons, Monitoring, Chemicals.
Identifiers: *Methylbutyl ketone, *Peripheral neuropathy, Organic solvents(Chemicals).

The need for systems of early warning for toxicity is illustrated by early results of a study which showed that workers in a fabrics coating plant suffered from toxic peripheral neuropathy in which an organic solvent used in the printing operation--methylbutyl ketone (MBK)--was highly suspect as the etiological agent. Investigation revealed that other chemicals commonly known to produce a toxic neuropathy, such as hexane, acrylamide, trio-cresyl-phosphate and thallium, had not been in use in the plant for more than 10 years. The only significant change in operation was a substitution of MBK for another organic solvent. The first symptoms of the disease appeared 16 months after the substitution began on a partial basis. The use of a large number of chemical compounds in the plant, many for which there was little toxicological information, markedly complicated the assessment of the problem. Most such studies, furthermore, address a single-agent concept whereas workmen in industrial situations are often exposed to a variety of toxic compounds and other chemical agents whose synergistic or additive properties may well lead to hitherto-unknown effects. (See also W77-02835) (Harris-Wisconsin)
W77-02838

**ESTABLISHING ENVIRONMENTAL PRIORITIES FOR SYNTHETIC ORGANIC CHEMICALS: FOCUSING ON THE NEXT PCBS,**
Syracuse Univ. Research Corp., N. Y.
P. H. Howard.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 51-65. 3 tab., 21 ref. 68-01-2202.

Descriptors: *Chemicals, *Toxins, *Toxicity, *Epidemiology, *Analytical techniques, Public health, Poisons, Polychlorinated biphenyls, Industrial production, Path of pollutants, Organic compounds, Priorities, Hazards.
Identifiers: *Priority-ranking techniques, Chlorinated napthalenes, Silicones, Fluorocarbons, Benzenecarboxylates, Chlorophenols.

Exact toxic effects are known for only a small proportion of the more than 9000 synthetic organic chemicals produced in commercial quantities in the United States. Because detailed studies to evaluate chronic toxicity costs an estimated $100,000 to $2000,000 per chemical, it is unlikely that all of the 300 to 500 new chemicals annually introduced for commercial use can receive more than a cursory evaluation. Therefore, a procedure is necessary whereby such testing can be priority-ranked for each chemical in terms of readily described or projected parameter. These would include environmental contamination potential, environmental stability and probable environmental distribution. Marketing information, for example, would provide insight into the probable route and destination in the environment of such contaminants as PCBs. Once the fate of such pollution were estimated, the stability parameter could be used to estimate the likely degradation or alteration mechanism and action time for the compound. Finally, an estimate could be made as to where the chemical might concentrate to dangerous levels in the environment. Examples of organic chemical hazard assessment are given for five groups of chemicals; chlorinated napthalenes, fluorocarbons, benzenepolycarboxylates and chlorophenols. (See also W77-02835) (Harris-Wisconsin)
W77-02839

**1974 - A YEAR OF TRANSITION,**
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances.
For primary bibliographic entry see Field 5G.
W77-02840

**REVIEW OF HEALTH/ENVIRONMENTAL SYSTEMS WITH POTENTIAL EARLY WARNING APPLICATIONS,**
Battelle-Columbus Labs., Ohio.
T. J. Thomas, and J. E. Flinn.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 128-150. 2 fig., 1 tab., 7 ref.

Descriptors: *Pollutant identification, *Chemicals, *Chemicals, *Chemical analysis, *Toxins, *Toxicity, *Indicators, *Public health, Analytical techniques, Analysis, Evaluation, Poisons.
Identifiers: *Problem identification and ranking, Prioritization systems, Evaluation systems.

Although a variety of methodologies have been developed which might be utilized to identify and priority-rank chemicals for their health and environmental effects, the Environmental Protection Agency's Office of Toxic Substances (OTS) finds that none of the methodologies have a frame of reference broad enough to select, assess and prioritize in a sufficiently comprehensive manner. However, many of the methodologies could represent important adjuncts to any OTS efforts to monitor public exposure to various chemicals. Three types of identification/ranking systems are: (1) those which provide information repositories for chemical toxicity data; (2) those designed to identify chemical substances before the time of general public exposure; and (3) those which provide post-exposure surveillance. Each of these can be further subcategorized as those which basically seek to identify new or unrecognized chemical stressors and those which seek to evaluate the hazard of a recognized stressor. Finally identification/ranking systems differ according to the way in which a candidate list of substances for evaluation is identified: (1) systematic literature scanning; (2) licensing; (3) test protocols; (4) expert panels; (5) data base sampling, accumulation or analysis; and (6) incident reports. Elements of these existing systems could be used to conceptualize three potential designs for a prioritization/classification scheme of sufficient comprehensiveness. (See also W77-02835) (Harris-Wisconsin)

W77-02841

**A RESEARCH PROGRAM TO ACQUIRE AND ANALYZE INFORMATION ON CHEMICALS THAT IMPACT ON MAN AND HIS ENVIRONMENT,**
Stanford Research Inst., Menlo Park, Calif.
A. A. McGee, and K. E. McCaleb.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 151-153.

Descriptors: *Chemicals, *Public health, *Toxins, *Toxicity, Analytical techniques, Analysis, Evaluation, Poisons, Diseases, Pollutant identification.
Identifiers: *Carcinogenic chemicals, *Cancer-inducing substances, *Evaluation systems, Problem identification and ranking.

A data collection and analysis system for carcinogenic chemicals screening has been developed to aid the National Cancer Institute Carcinogenesis Program in selecting chemicals for testing. The system utilizes the current carcinogenic information data base which lists 3,200 chemicals categorized as intentional food additives, pesticide residues in food, proprietary drugs, prescription drugs, cosmetics, air pollutats, water pollutants, soaps and detergents and trade sales paints. These categories are subdivided into 900 product types which represent 18,000 chemical product combinations. Computer-readable data contain the following information: product name, quantity available for exposure, exposure routes (oral, dermal, respiratory and parenteral), exposure factor by route, CAS number and name, potency, (percentage of chemical) in each product, degree of uncertainty accociated with quantitative data and references to data sources. In addition to the information on the exposure categories, another data bank of 25,000 chemicals has been developed, drawn from 18 recognized information sources. Description is also given of a computerized chemical classification scheme which allows a node assignment to be made for each of the chemicals for which exposure estimates have been made. The availability of additional biological data in the future may make it possible to make informed guesses as to a molecule's carcinogenic potential based on the classification scheme. (See also W77-02835) (Harris-Wisconsin)
W77-02842

**NATIONAL CANCER INSTITUTE PROGRAM OF CANCER SURVEILLANCE, EPIDEMIOLOGY AND END RESULTS REPORTING (SEER PROGRAM),**
National Cancer Inst., Bethesda, Md. Biometry Branch.
J. L. Murray, and S. J. Cutler.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 154-166. 5 fig., 2 tab., 4 ref.

Descriptors: *Epidemiology, *Public health, *Diseases, Toxins, Toxicity, Analysis, Analytical techniques, Poisons.
Identifiers: *Evaluation systems, Carcinogenic chemicals, Cancer-inducing substances.

The program is described through which information is provided on long-term trends in cancer occurrence in the United States, on occurrence variations in various population groups and geographic areas, new developments in diagnostic and treatment practices and changing trends in the effects of the disease among patients. The overall effort is focused on developing means to accurately assess cancer risks in groups and individuals and on evaluating the presence, extent and probable course of existing cancers. The SEER program involves two types of participants. One type consists of population-based tumor registries which attempt to obtain information on every newly-diagnosed cancer case and cancer-related deaths among populations of a defined size. The second type includes epidemiology research and training centers. Current SEER program participants include nine contract agencies whose study areas cover five whole states and parts of four others, with population bases of almost 19 million. According to present knowledge, many types of cancer are associated with environmental factors such as pollutants, and a majority of cancer deaths are attributable to them. (See also W77-02835) (Harris-Wisconsin)
W77-02843

**A COST-RISK-BENEFIT ANALYSIS OF TOXIC SUBSTANCES,**
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02844

**THE WORLD HEALTH ORGANIZATION'S ENVIRONMENTAL HEALTH CRITERIA AND AIR MONITORING PROGRAMS,**
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5G.
W77-02845

**PUBLIC INTEREST METHODS FOR ASSESSING CHEMICAL HAZARDS,**
Center for Science in the Public Interest, Washington, D.C.
For primary bibliographic entry see Field 5C.
W77-02846

**EARLY-WARNING SYSTEM FOR TOXIC SUBSTANCES: HUMAN HEALTH ASPECTS,**
National Environmental Research Center, Research Triangle Park, N.C.
A. V. Colucci, and P. E. Brubaker.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p 5-12.

Descriptors: *Warning systems, *Forecasting, *Public health, *Epidemiology, *Human diseases, *Toxicity, *Toxins, *Pollutants, Social aspects, Human pathology, Poisons, Diseases.
Identifiers: *Public health screening, *Disease detection, *Disease screening.

Clinical medicine and epidemiology supported by environmental monitoring, biochemical and physiological research programs are all multidisciplinary elements of an approach needed to overcome difficulties of studying the human health effects of environmental pollutants. An overview of current early warning approaches shows that many existing epidemiological and clinical studies mounted by government and private industry have significant similarities. EPA's Community Health and Environmental Surveillance System and Community Pesticide Studies, Clinical Laboratory Evaluation and Assessment of Noxious Substances, Assessment of Cellular Toxicity and Interactions of Noxious Substances, National Environmental Banking System, along with programs sponsored by the Department of Health, Education and Welfare, the National Institute of Occupational Safety and Health, the Food and Drug Administration and the National Institute of Environmental Health Sciences, are currently used to predict changes in trends of existing pollutants. Such programs could be expanded into an early warning system by broadening the scope of pollutant monitoring and exposure and by improving health information gathering. One prototype of an early warning system is the integrated effort being developed by the Kaiser-Permanente Program now operative in five western states, in which an average of 15 basic screening procedures are used. (See also W77-02835) (Harris-Wisconsin)
W77-02847

**A LABORATORY MODEL ECOSYSTEM AS AN ELEMENT IN EARLY-WARNING SYSTEMS FOR TOXIC SUBSTANCES,**
Illinois Univ. at Urbana-Champaign. Inst. for Environmental Studies.
R. L. Metcalf.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p 67-81. 3 fig, 4 tab, 18 ref. EP-R-802022.

Descriptors: *Laboratory tests, *Tracking techniques, *Marking techniques, *Radiochemical analysis, *Toxins, *Toxicity, Analytical techniques, Tracers, Path of pollutants, Biodegradation, Chromatography, Water pollution, Poisons, Industrial wastes, Organic compounds, Pesticides, Chemicals, Persistence.
Identifiers: Radioisotope labeling.

A laboratory model ecosystem for evaluating micropollutant potentialities of a variety of synthetic organic compounds, previously described by the author in other literature, offers three major uses: (1) Screening new pesticides for toxic effects to a number of organisms in the environment, to determine degradation pathways and to characterize bioaccumulation and biodegradability; (2) evaluating suitability of various pesticides for specific uses involving environmental contamination; and (3) evaluating the pollution potential of various synthetic chemicals which may enter the aquatic environment as trace contaminants. The model ecosystem is based on use of radiolabeled molecules which permits tracing of parent compounds and degradation products through various organisms and food chains and which facilitates quantitative determination of amounts stored in various organisms. Instructions are given for construction of replicas of the laboratory model ecosystem, which involve use of a glass aquarium containing a sloping shelf of washed white sand, filled with water and seeded with plankton and sorghum seeds, the whole of which is then subject to application by the radiolabeled pesticides. Results and evaluations are given for laboratory tests of various pesticides using the method. (See also W77-02835) (Harris-Wisconsin)
W77-02848

**LANDSCAPE GEOCHEMISTRY AND ENVIRONMENTAL PROBLEMS,**
Brock Univ., St. Catharines (Ontario). Dept. of Geological Sciences.
J. A. C. Fortescue.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p 13-34. 11 fig, 21 ref.

Descriptors: *Monitoring, *Warning systems, *Geochemistry, *Soil chemistry, *Soil analysis, *Public health, Trace elements, Analytical techniques, Toxicity, Water quality, Poisons, Diseases, Toxins.

Geochemistry, especially its lithospheric aspects, might provide early warnings of toxic materials in the environment, if research is applied in a useful frame-of-reference. Three approach levels should be categorized: a 'grand strategic' level which includes broad generalizations upon which geochemistry is based; a 'strategic' level which involves concepts associated with the landscape aspects of geochemistry; and a 'tactical' level which is concerned only with the description of examples of applied landscape geochemistry to

solving specific environmental problems. Reference is made to five examples of tactical-level investigations from which strategic and even grand-strategic generalizations might be drawn in application to toxicity studies: (1) distribution patterns of aluminum and lead in a forested landscape area; (2) effects on copper, zinc, lead and nickel uptakes by changes in the growth rate of certain forest trees brought about by an attack by the forest tent caterpillar during four growing seasons; (3) using lake sediment cores to detect human effects on the chemistry of the environment; (4) using stream sediments to detect natural and man-made variations in the chemistry of drainage basins; and (5) using stream sediments to locate an area characterized by molybdenum-induced copper deficiencies in cattle. (See also W77-02835) (Harris-Wisconsin)
W77-02849

**LEGISLATION AND LAWS CONCERNING EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES,**
Committee on Commerce (U. S. Senate).
For primary bibliographic entry see Field 5G.
W77-02850

**CONTROL AND MONITOR INSTRUMENTATION FOR MUST WATER PROCESSING ELEMENT, FINAL REPORT,**
Life Systems, Inc., Cleveland, Ohio.
G. G. See, K. K. Kacholia, and R. A. Wynveen.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-018 156, Price codes: A07 in paper copy, A01 in microfiche. Report LSI ER-242-6, June 1975, 123 p, 37 fig, 32 tab, 22 ref. DADA 17-73-C-3163.

Descriptors: Treatment, *Waste treatment, *Water quality, *Waste water treatment, Management, Instrumentation, Monitoring, Water quality control.
Identifiers: *Medical Unit Self-Contained Trasportable, *MUST Water Processing Elements.

The evaluation program was primarily directed toward monitor instrumentation with secondary considerations given to its impact on control instrumentation. Areas of emphasis were survey of proper control and monitor instrumentation for the unit processes in the MUST WPE and the integrated system, conducting a trade-off analysis between spectator-analyzed performance data and various levels of automatic analysis, evaluating potable water quality monitoring requirements, and preparing a comparison of instrumentation alternatives. Suggestions which incorporate specific maintainability and reliability features into the WPE design include sensor redundancy, performance trend, and fault analysis, and design of components as Line Replaceable Units. (Chilton-ORNL)
W77-02878

**ENVIRONMENTAL MEASUREMENTS OF AIR AND WATER QUALITY,**
California Univ., Berkeley, Lawrence Berkeley Lab.
D. A. Mack.
(1975). 12 p, 6 tab, 2 fig, 17 ref.

Descriptors: *Water quality, Environment sanitation, *Water pollution, Analytical techniques, Measurement, *Monitoring, Spectrophotometry, Spectroscopy, *Pollutant identification, *Air pollution, Gas chromatography.

The paper lists the most prevalent air and water pollutants, notes typical levels encountered in background and urban concentrations and examines the methods presently employed in their analysis. Water quality analysis deals primarily with measurement of inorganic chemicals, metals, and organic chemicals, mainly pesticides. Atomic absorption spectrophotometry is identified as the chief method for measuring the metal content of water samples. Gas chromatography is routinely employed in pesticide analysis. Categories for improved water monitoring include improved ion-selective and gas membrane electrodes for a number of ions and gases, development of atomic absorption spectrophotometers with improved furnace techniques, and the use of an inductively coupled plasma in emission spectroscopy which may allow multi-element capability at ambient levels. (Chilton-ORNL)
W77-02880

**THE STUDY OF THE EFFECT OF SEA ROUGHNESS ON THE REMOTE SENSING OF OIL POLLUTION BY THE ACTIVE METHOD, (IN RUSSIAN),**
Leningrad Electrical Engineering Inst. (USSR).
V. V. Bogorodskii, M. A. Kropotkin, and T. Y. Sheveleva.
Okeanologiya 15(6), p 1112-1115, 1975.

Descriptors: *Oil pollution, *Remote sensing, *Pollutant identification.
Identifiers: Baltic Sea, Sea roughness.

Experimental data on the influence of sea roughness on the remote sensing of oil pollution by the laser location method are described. Investigations were carried out in the Baltic Sea at wind speeds of 3-15 m/s with a special electrical model. Dynamic time constant and contrast in the reflectance properties of oil pollution and pure water vs. wind speed were determined.--Copyright 1976, Biological Abstracts, Inc.
W77-02898

**MEASUREMENTS OF POLYCHLORINATED BIPHENYL (PCB) IN WATER, SEDIMENTS, AND ORGANISMS OF TWO RIVERS IN HIROSHIMA PREFECTURE, (IN JAPANESE),**
Hiroshima Univ. (Japan). Dept. of Fisheries; and Hiroshima Univ. (Japan). Faculty of Fisheries and Animal Husbandry.
H. Nakagawa, M. Kayama, and E. Ariyoshi.
J Fac Fish Anim Husb Hiroshima Univ. 14(2), p 253-259, 1975.

Descriptors: *Polychlorinated biphenyls, Sediments, Rivers, Asia, Measurement, Pollutant identification, Carp, Snails, Mullets, Distribution patterns, Path of pollutants.
Identifiers: Hiroshima, Japan, Mullet.

In the Ashida river and Hironishiohkawa of Hiroshima Prefecture, Japan, PCB water contents, sediments and aquatic organisms were detected. Not all the water samples contained PCB. PCB contents in fish (carp, mullet) and shellfish (snails) in the Ashida river reached 0.01 and 0.24 mg/kg. The PCB distribution pattern in different grain-sized sediments in both rivers indicates that PCB was distributed mostly in smaller grain-size sediments. Analysis of PCB in sediments should take special account of grain size.--Copyright 1976, Biological Abstracts, Inc.
W77-02899

**IDENTIFICATION OF ACID-CONTAINING FRACTION OF ODORANTS OF NATURAL WATER, (IN RUSSIAN),**
Akademiya Nauk URSR, Kiev. Inst. of Colloidal Chemistry and Water.
L. A. Mel'nichenko, A. T. Pilipenko, and I. T. Goronovskii.
Gidrobiol Zh 11(6), p 86-90, 1975.

Descriptors: Acids, Algae, *Cyanophyta, *Eutrophication, *Organic acids, *Pollutant identification, *Gas chromatography, *Spectroscopy, Odor.
Identifiers: Aphanizomenon-flos-aquae, Fatty acids, Microcystis-aeruginosa.

The role of organic acids in the formation of persistent odors of natural water during the 'bloom' period of blue-green algae (predominantly Microcystis aeruginosa and Aphanizomenon flos-aquae) was investigated, and attempts were made to identify them by gas-chromatography and IR spectroscopy. The acid composition of natural waters during the 'bloom' period is extremely variable. Among the odorants were saturated and unsaturated fatty acids as components of complex volatile products.--Copyright 1976, Biological Abstracts, Inc.
W77-02901

**STUDY OF A RELATIONSHIP BETWEEN CHEMICAL AND BACTERIOLOGICAL POLLUTION IN THE COASTAL ZONES, (IN FRENCH),**
CEA Centre de Pierrelatte (France).
M. Archimbaud, and C. Trouve.
Water Research 10(3), p 225-229, 1976.

Descriptors: Water pollution, Bacteria, Chemicals, Coasts, *Pollutant identification, Environment, *Sampling.
Identifiers: Bacteriological studies, Chemical studies, Coastal zones, *France.

In the places and circumstances where samples were taken (France) there is a clear connection between chemical and bacteriological pollution. The zone of uncertainty still surrounding close to 1/3 of the samples can be reduced by a complementary study. This could pinpoint the meteorological and environmental parameters not yet studied. Bacteriological studies will still be needed after chemical studies are made. The latter will serve as a framework for preventive action.--Copyright 1976, Biological Abstracts, Inc.
W77-02903

**EXPERIENCE IN CENTRALIZED COLLECTION, PROCESSING AND ANALYSIS OF SANITARY-HYGIENIC INFORMATION, (IN RUSSIAN),**
Municipal Sanitary Epidemiology Station, Novokuznetsk (USSR).
O. I. Samuilo, Z. F. Karpova, and E. M. Deeva.
Gig Sanit 12, p 60-61, 1975.

Descriptors: *Information retrieval, Public health, *Sewage, *Air pollution, *Water pollution, *Industrial wastes, Monitoring, Data collections.

A punched card-type information retrieval system used for centralized collection and processing of information contained in reports of sanitary-hygienic investigations permits concentration of information on the sanitary state of urban objects (sewage, air and water pollution, industrial discharges, etc.), enabling prompt observation and monitoring of the state of the environment and activities of the sanitary-epidemiological stations.--Copyright 1976, Biological Abstracts, Inc.
W77-02908

**METHODS OF BALANCING AND CALCULATING THE O2 BALANCE OF THE MIDDLE COURSE OF THE SAALE RIVER, (IN GERMAN),**
S. J. Casper, and W. Schoenborn.
Limnologica 10(1), p 191-195, 1976.

Descriptors: *Oxygen requirements, Biochemical oxygen demand, Methodology, Measurement, Phytoplankton, Periphyton, Oxygen demand, Rivers, Pollutant identification.
Identifiers: *Saale River(E. Germany).

The biogenic (phytoplanktonic, periphytic) and physical (atmospheric) O2 production and the biochemical O2 requirement of 2 sections of the river, between Eichicht and Fischersdorf and between Rothenstein and Grossheringen (East Germany), were balanced. Physical O2 production

determines O2 balance. The O2 production of the phytoplankton became more significant and the percentage of the physical O2 production diminished as the lowland characteristics of the river became more pronounced. The Boehnke (1965) method proved practical in calculating changes in O2 content.--Copyright 1976. Biological Abstracts, Inc.
W77-02911

**THE RATE OF MICROBIOLOGICAL OXIDATION OF METHANE DETERMINED WITH THE AID OF LABELED (CARBON-14) METHANE, (IN RUSSIAN),**
For primary bibliographic entry see Field 5B.
W77-02962

**RECORDS OF WELLS AND WATER QUALITY FOR THE GARBER-WELLINGTON AQUIFER, NORTHERN OKLAHOMA AND SOUTHERN LOGAN COUNTIES, OKLAHOMA,**
Geological Survey, Oklahoma City, Okla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02974

**MAPPING AND MEASURING LAND-COVER CHARACTERISTICS OF NEW RIVER BASIN, TENNESSEE, USING LANDSAT DIGITAL TAPES,**
Geological Survey, Nashville, Tenn. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02978

**A WATER-QUALITY ASSESSMENT OF THE BURNHAM CREEK WATERSHED, POLK COUNTY, MINNESOTA,**
Geological Survey, St. Paul, Minn. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02979

**AN APPRAISAL OF GROUND WATER FOR IRRIGATION IN THE APPLETON AREA, WEST-CENTRAL MINNESOTA,**
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02982

**WATER-RESOURCES DATA FOR DEEP AQUIFERS ON EASTERN MONTANA,**
Geological Survey, Helena, Mont. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02985

**INDEX TO WATER RESOURCES DATA FOR ILLINOIS,**
Geological Survey, Champaign, Ill. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02990

**SAMPLING AND ANALYSIS OF STORM-WATER RUNOFF FROM URBAN AND SEMI-URBAN/RURAL WATERSHEDS - SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES,**
Purdue Univ., Lafayette, Ind. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W77-02995

**DETECTION OF PATHOGENIC LEPTOSPIRES IN EFFLUENT AND SEWAGE SLUDGE FROM LARGE PIGGERIES, (IN GERMAN),**
Institutul Agronomic din Timisorara (Rumania). Faculty of Veterinary Medicine.
R. M. Minzat, and V. Tomescu.
Arch Exp Veterinaermed 29(4), p 557-562, 1975.

Descriptors: *Farm wastes, *Sewage effluents, *Water pollution sources, *Sludge, *Sewage bacteria, Hazards, Cultures, Sewage treatment, Pathogenic bacteria, Hogs, *Pollutant identification.
Identifiers: Leptospira pomona, Leptospira tarassovi, *Leptospires, Piggeries.

Sewage effluent and sludge from the purification plant of 8 large piggeries was examined for the presence of pathogenic leptospires; 43.1% of effluent samples were contaminated with Leptospira pomona and L. tarassovi, and 33 strains of L. pomona and 3 mixed cultures of L. pomona and L. tarassovi were obtained. The isolated strains were pathogenic by experimental infection of guinea-pigs, rabbits and pregnant and non-pregnant sows. The average survival period of pathogenic leptospires in sewage effluent was 24-48 h, with a maximum of 96 h. Leptospires were killed within 24 h in decanted sludge, due to its strong acidity. Water pollution by pathogenic leptospires by way of untreated sewage from piggeries poses a risk of an epidemic among persons bathing in contaminated surface waters.
W77-02998

**STANDARD TEST FISH DEVELOPMENT. PART I. FAT-HEAD MINNOWS (PIMEPHALES PROMELAS) AND GOLDFISH (CARASSIUS AURATUS) AS STANDARD FISH IN BIOASSAYS AND THEIR REACTION TO POTENTIAL REFERENCE TOXICANTS,**
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
I. R. Adelman, and L. L. Smith, Jr.
Environmental Protection Agency, Ecological Research Series, Report EPA-600/3-76-061a, July 1976, 76 p, 23 tab, 4 fig, 24 ref.

Descriptors: *Methodology, *Toxicity, *Bioassay, Fish, *Chromium, *Sodium chloride, Pesticides, Laboratory animals, *Laboratory tests, *Water pollution effects, Herbicides, Metals, Life cycles, Growth stage, Freshwater fish, *Minnows, *Pollutant identification.
Identifiers: *Goldfish, Guthion, Acute toxicity, *Fathead minnows, Hexavalent chromium, Pentachlorophenol, Reference toxicant.

Fathead minnows and goldfish were compared for variability of L50's with four toxicants as a means of determining their suitability as a standard bioassay fish. Acute bioassays with sodium chloride, penta-chlorophenol, hexavalent chromium and Guthion (R) were conducted with both species; and results were reported as toxicity curves as well as LC50's at various times. Both species showed similar variability of bioassay results. Bioassays of pentachlorophenol were conducted with both species to determine the effect of testing different sized fish at the same age or testing different aged fish. Size selection of fish within the ranges tested is unnecessary since differences in LC50's were small. Since age of fathead minnows did not affect the LC50's after 24 hours, use of younger fish would allow smaller bioassay chambers or more fish per chamber. Since goldfish could not be induced to complete a life cycle in the laboratory in less than one year, fathead minnows were superior as a standard species because of their smaller size and their utility in complete life cycle tests. On the basis of seven criteria, sodium chloride was superior for use as a reference toxicant with pentachlorophenol a close second choice. (See also W77-03003) (Katz)
W77-03002

**STANDARD TEST FISH DEVELOPMENT. PART II: CHRONIC TOXICITY OF GUTHION TO THE FATHEAD MINNOW (PIMEPHALES PROMELAS REFINESQUE),**
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
I. R. Adelman, and L. L. Smith, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 785, Price codes: A03 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecological Research Series, Report EPA 600/3-76-061b, July, 1976. 22 p. 5 tab, 9 ref.

Descriptors: *Bioassay, *Minnows, *Toxicity, *Mortality, Laboratory animals, Laboratory tests, *Water pollution effects, Freshwater fish, *Methodology, Water quality, Growth stages, Life cycles, Statistical methods, *Pollutant identification.
Identifiers: *Guthion(R), *Chronic toxicity, *Application factor, Maximum acceptable toxicant concentration, *Fathead minnows.

Three chronic bioassays of Guthion(R) were conducted with fathead minnows. All tests were begun with eggs and the longest lasted 20 days after termination of spawning, a total of 250 days. Parameters measured were survival, growth, fecundity, and growth and survival of second generation fry and eggs. The most sensitive criteria for effect of the toxicant was fecundity. The maximum acceptable toxicant concentration was between 0.33 and 0.51 ug/liter Guthion(R), and the application factor was between .0017 and .0027 based on a soft water acute and a hard water chronic bioassay. (See also W77-03002) (Katz)
W77-03003

**ANALYSIS AND GC-MS CHARACTERIZATION OF TOXAPHENE IN FISH AND WATER,**
Fish and Wildlife Service, Columbia, Mo. Fish-Pesticide Research Lab.
D. L. Stalling, and J. N. Huckins.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 773, Price codes: A04 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecological Research Series, Report EPA-600/3-76-076, August 1976, 42 p. 2 tab, 19 fig, 12 ref.

Descriptors: *Brook trout, *Pesticides, *Insecticides, *Chlorinated hydrocarbon pesticides, Chromatography, *Analytical techniques, *Gas chromatography, *Mass spectrometry, Methodology, *Water quality, *Path of pollutants, *Pollutant identification.
Identifiers: *Toxaphene, Polyurethane foam, Gel permeation chromatography, Silicic acid chromatography, *Multicomponent toxaphene residues, Electron impact mass spectrometry, Chemical ionization.

Sensitive methods for the detection and identification of toxaphene in water and fish were described. Polyurethane foam, gel permeation and silicic acid chromatography were utilized to permit accurate quantitation of multi-component toxaphene residues. A method for characterization of changes in isomer composition of toxaphene residues in fish was reported. The chemical composition of toxaphene was examined by electron impact and chemical ionization mass spectrometry. Chemical ionization gas chromatography-mass spectrometry was particularly applicable to the analysis and confirmation of toxaphene residues in environmental samples. (Katz)
W77-03005

**CONTENT OF LITHIUM, URANIUM AND THORIUM IN MINERAL SPRINGS OF THE NAKHICHEVAN ASSR, (IN RUSSIAN),**
A. I. Baeva, E. A. Mugalinskaya, and A. B. Akhundova.
Izv Adka Nauk Az Ssr Ser Biol Nauk 2, p 73-77, 1975.

Descriptors: *Mineral water, *Springs, *Solutes, *Bottom sediments, Chemical properties, *Pollutant identification.
Identifiers: Azerbaijan SSR, Balneology, *Lithium, Nakhichevan ASSR, *Thorium, *Uranium, USSR, Badamly, Sirba, Darydag.

Data are presented on the content of Li, U and Th in water and bottom deposits of 3 groups (Badamly, Sirba and Darydag) of mineral springs in the Nakhichevan ASSR (Azerbaijan SSR, USSR), showing that the content of these elements does not exceed the maximum allowable concentrations of soluble compounds of these elements in water. The mineral springs of the Darydag group had the maximum indices with respect to Li, U and Th. This is probably the cause of the high balneological effect (on humans) of the mineral water of these springs. Of the indicated elements, U has a relatively high tendency to accumulate in the bottom deposits of the springs.--Copyright 1976, Biological Abstracts, Inc.
W77-03016

**THIN-LAYER CHROMATOGRAPHIC DETERMINATION OF ANTHIO AND BUTYPHOS IN WATER, (IN RUSSIAN),**
Uzbekskii Nauchno-Issledovatelskii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent (USSR).
N. G. Popova, Yu. U. Khasanov, and T. B. Muzykantova.
Gig Sanit 6, p 50-51, 1975.

Descriptors: *Pesticides, *Defoliants, *Pollutant identification, *Separation techniques, *Water pollution sources, Testing, Sampling, *Chromatography, *Pesticide residues.
Identifiers: Anthio, Butyphos, USSR, Thin layer chromatography.

The methods for determining the pesticide anthio (active principle 0,0-dimethyl-S,W-methyl-(N-formycarbamoylmethyl)phosphorodithioate) and cotton defoliant butyphos (S,S,S,-tributyl phosphorotrithioate) are based on their separation and quantitative determination in a thin layer of silica gel. The zones of localization of both preparations are detected by a mixture of solutions of bromphenol blue and silver nitrate. The quantity of the preparations is established by a visual comparison of the staining intensity and spot sizes of the sample and standard solutions. The sensitivity of the determination is 0.05 mg/l.
W77-03022

**A NEW TOWED UNDERWATER CAMERA SYSTEM FOR WIDE-RANGE BENTHIC SURVEYS,**
Vienna Univ. (Austria). Lehrkanzel fuer Meeresbiologie.
For primary bibliographic entry see Field 7B.
W77-03030

**CHLORINATED HYDROCARBONS IN CETACEANS,**
Rhode Island Univ., Kingston. Graduate School of Oceanography.
A. G. Taruski, C. E. Olney, and H. E. Winn.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2205-2209, 1975. 2 tab, 27 ref.

Descriptors: *Path of pollutants, *Chlorinated hydrocarbon pesticides, *DDT, *Polychlorinated biphenyls, *Pesticide residues, *Dieldrin, Marine animals, Pesticides, Gas chromatography, Absorption, Mammals, *Pollutant identification.
Identifiers: *Cetaceans, *Whales, *Dolphins, *Chlordane.

DDT, PCB's, chlordane and dieldrin levels were measured in blubber of 18 cetaceans, including humpback, sperm, dense-beaked, Atlantic and Pacific pilot whales, and five species of dolphins. All had significant residue levels, ranging from 1.1 to 1023 ppm DDT (wet weight basis) and 0.7-147 ppm PCBs. These levels are high enough to justify efforts to reduce PCB contamination of the oceans and a continued ban on widespread use of DDT. (Katz)
W77-03033

**DIELDRIN IN THE DIET OF CHANNEL CATFISH (ICTALURUS PUNCTATUS): UPTAKE AND EFFECT ON GROWTH,**
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
For primary bibliographic entry see Field 5C.
W77-03034

**FLUORINE IN DRINKING WATER OF EASTERN SLOVAKIA, (IN RUSSIAN),**
Univerzita Pavala Jozefa Safarika, Kosice (Czechoslovakia). Faculty of Medicine.
T. Petrilyakova, M. Mikulova, and P. Postishil.
Gig Sanit 4, p 82-84, 1975.

Descriptors: *Potable water, *Fluorine, Sedimentary rocks, Mineral water, Pollutant identification, Sampling.
Identifiers: *Czechoslovakia, Slovakia, Flysch.

In 1970-1972 541 drinking water samples from 284 populated areas of Eastern Slovakia were investigated; 44% of the samples contained F in a concentration of 0.00-0.10 mg/l, 37% had 0.15-0.45 mgF/l, and 16% had optimal F concentrations, 0.50-1.2 mg/l. The comparatively low F content in drinking waters is due to the face that the territory of Eastern Slovakia is composed primarily of flysch-type sedimentary rocks. More mineralized waters contain F in greater concentrations.
W77-03056

## 5B. Sources Of Pollution

**MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. I. STUDY OF LIGNIN DECOMPOSITION PRODUCTS (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. I. ISSLEDOVANIE PRODUKTOV RAZRUSHENIYA LIGNINA),**
Vsesoyuznyi-Nauchnyi Planovii Otdel Bumazhnoi Promyshlennostn Moscow (USSR).
M. M. Krunchak, I. Ya. Stanyukovich, and T. M. Kroshilova.
Khimiya Drevesiny, No. 3, p 97-101, May/June, 1976. 3 fig, 8 ref, 2 tab.

Descriptors: *Pulp wastes, *Lignins, Degradation(Decomposition), Effluents, Pine trees, Separation techniques, Chromatography, Model studies, Waste water(Pollution), Water pollution sources, Wastes, Industrial wastes.
Identifiers: Dioxane lignin, Black liquors, Molecular weight, Kraft mills.

Dioxane lignin from pine wood was subjected to alkaline cooking under conditions simulating those used in the production of kraft pulp (24% NaOH, 20% sulfidity, 8:1 liquor ration at 170 C for 3 hr). The black liquor from the reaction was fractionated by extraction with various solvents at pH 11.5 to 1.5. A diagram of the fractionated procedure is given. All the fractions were analyzed by gel chromatography for the purpose of comparing the molecular weight distribution curves. The molecular weight distribution of the acid-insoluble fraction was similar to that of the starting dioxane lignin. The acid-soluble fractions were dispersed over a wide range of molecular weights. The amount of monomeric material was small. (See also W77-02586 and W77-02587) (Chern-IPC)
W77-02585

**MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. II. PHYSICOCHEMICAL PROPERTIES OF LIGNIN DECOMPOSITION PRODUCT (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. II. FIZIKO-KHIMICHESKAYA KHARAKTERISTIKA PRODUKOV RAZRUSHENIYA LIGNINA),**
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost Moscow (USSR).
I. Ya. Stanyukovich, M. M. Krunchak, and T. M. Kroshilova.
Khimiya Drevesiny, No. 3, p 102-104, May/June, 1976. 2 fig, 6 ref, 2 tab.

Descriptors: *Pulp wastes, *Lignins, *Physicochemical properties, Effluents, Pine trees, Model studies, Water pollution sources, Wastes, Industrial wastes, Organic acids, Organic compounds.
Identifiers: Dioxane lignin, Functional groups, Ultraviolet spectra, Infrared spectra, Kraft mills, Black liquors.

The functional groups of the fractions obtained from the alkaline pulping of pine dioxane lignin under conditions simulating production of kraft pulp were analyzed by IR and UV methods. With decreasing pH the carboxyl group content in the acid-soluble fractions increased while the phenolic OH content decreased. All of the fractions had methoxyl group contents of 11-17%, except the ether-soluble fraction at pH 1.5 which had methoxyl content of 8.94%. The data are in agreement with literature data on the composition of the organic portion of black liquor. IR spectra are included. (See also W77-02585 and W77-02587) (Chern-IPC)
W77-02586

**MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. III. STUDY OF CARBOHYDRATE DECOMPOSITION PRODUCTS (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. III. IZUCHENIE PRODUCKTOV RAZRUSHENIYA UGLEVODNOI CHASTI DREVESINY),**
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost Moscow (USSR).
M. M. Krunchak, I. Ya. Stanyukovich, and N. A. Ivanov.
Khimiya Drevesiny, No. 3, p 105-109, May/June, 1976. 3 fig, 9 ref, 1 tab.

Descriptors: *Pulp wastes, *Carbohydrates, Effluents, Organic acids, Lignins, Organic compounds, Lead, Salts, Wastes, Industrial wastes, Water pollution sources, Pine trees, Model studies.
Identifiers: Holocellulose, Kraft mills, Fatty acids, Acetic acid, Black liquors.

Holocellulose obtained in 70% yield from pinewood by the peracetic acid method was subjected to alkaline pulping under conditions simulating production of kraft pulp. The starting holocellulose consisted of 90% reducing substances and 0.9% lignin. Carbohydrate loss during holocellulose isolation was 10%. Diagrams are given for the separation of the organic components from the alkaline pulping, separation of the acid and hydroxy acid fraction, and separation of acid and hydroxy acids from the lead salts. Analysis of the organic substances from the pulping of holocellulose indicated that the nonvolatile compounds consisted of hydroxy and polyhydroxy acids and their lactones. The volatile acid fraction consisted of fatty acids, mostly acetic. (See also W77-02585 and W77-02586) (Chern-IPC)
W77-02587

**GROUNDWATER POLLUTION BY WOOD WASTE DISPOSAL,**
Oregon State Dept. of Environmental Quality, Salem.
H. R. Sweet, and R. H. Fetrow.
Ground Water, Vol. 13, No. 2, p 227-231, March/April, 1976.

Descriptors: *Groundwater, *Lumbering, *Water pollution, *Wood wastes, *Oregon, Bark, Leachate, Lignins, Color, Odor, Iron, Manganese, Water pollution sources, Waste disposal, Wastes, Industrial wastes, Solid wastes, Water wells, Water pollution effects, Forest management.
Identifiers: Willamette Valley(Ore), Tannins, Forest products industry.

Timber production and wood products industries in the Mid-Willamette Valley of Oregon annually dispose of about 547,000 tons of wood and bark wastes. Land storage or disposal of these wastes can result in the generation of significant volumes of leachate. Wood waste leachates are commonly characterized by lignin-tannin (measured as tannic acid), oxygen-demanding materials, color, and odor. In this study, lignin-tannin concentrations in the groundwater ranged as high as 7.5 mg/liter; iron and manganese were also shown to increase markedly relative to natural background concentrations, ranging as high as 13 mg/liter and 106 mg/liter, respectively. In August 1972 the area affected by the contaminated groundwater covered about 4 acres (1.6 hr) and extended nearly 1,000 ft (330 m) downhill from the disposal site. By late January 1973 the plume had migrated laterally to affect an area of about 15 acres (6 ha) while extending over 1,500 ft (460 m) downhill. The lateral migration is attributed to a seasonal change in the local flow system. At least eleven existing domestic water-supply wells have been rendered nonpotable by this pollution. (Witt-IPC)
W77-02591

**GRAPHICAL INTERPRETATION OF WATER QUALITY DATA,**
Mississippi State Univ., Mississippi State. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W77-02592

**POLLUTION CONTROL IN INDIAN STEEL INDUSTRY,**
Regional Engineering Coll., Rourkela (India). Dept. of Metallurgical Engineering.
R. C. Behera, and P. K. Senapaty.
Chemical Age of India, Vol 27, No 6, p 533-538, June, 1976. 6 tab, 23 ref.

Descriptors: *Industrial wastes, *Waste water treatment, *Steel, *Water pollution control, *Chemical wastes, Adsorption, Filtration, Aeration, Activated sludge, Flotation, Settling basins, Oxidation, Chemical precipitation, Neutralization, Reduction(Chemical), Suspended solids, Oil wastes, Phenols, Ammonia, Sodium, Iron, Aeration.
Identifiers: *Steel industry(India), *India, Thiocyanates, Thiosulfates, Tin, Chromates.

Sources of pollution in the Indian steel industry are reviewed along with methods for their control. Water pollution is caused by waste waters in the form of coke oven liquor, blast furnace cooling water, lubricating water from rolling mills, pickling liquor and wash water from electrolytic processes, and blast furnace gas scrubbing water. Methods currently being used to control these sources of water pollution include: adsorption on fly ash, filtration through plastic media, aeration, activated sludge treatment, flotation, settling, chemical neutralization, chemical oxidation and reduction, and lime precipitation. Pollutants controlled by these processes include: phenols, ammonia, thiocyanate, thiosulfate, oil emulsions, iron, chromates, tin, sodium, and suspended solids. (Kreager-FIRL)
W77-02605

**CHEMICAL PULPING,**
H. Norrestrom.
Pure and Applied Chemistry, Vol. 45, No. 3/4, p 181-186, 1976. 15 fig, 6 tab.

Descriptors: *Pulp and paper industry, *Waste water treatment, *Pulp wastes, *Biochemical oxygen demand, *Color, Effluents, Liquid wastes, Bleaching wastes, Chemical wastes, Neutralization, Suspended solids.

Various types of pulping processes are discussed in relation to the amount of wastes they generate. A typical 7-day biochemical oxygen demand figure for mechanical pulping is 25 kg/ton of pulp, with the bleaching operation contributing about 10 kg/ton. The amount of suspended solids in the effluent is normally between 20 and 30 kg/ton of pulp. Anywhere from 150-600 kg biochemical oxygen demand/ton of pulp is generated during chemical pulping. Normally, however, the spent liquor is collected, evaporated, and burned leading to at least a 95% reduction in biochemical oxygen demand discharge. The total biochemical oxygen demand of digester and evaporator condensates is about 10-12 kg/ton for kraft pulping and about 25 kg/ton for sulfite pulping. The total biochemical oxygen demand and color in effluent generated by the bleaching of softwood kraft pulp are about 15 and 170 kg/ton, respectively. The amount of color in effluents from kraft pulp bleaching and the biochemical oxygen demand value for the sulfite process is also slightly lower than that for kraft processes. Techniques for reducing pollution from pulping processes include oxygen bleaching and neutralization of sulfide condensates. (Kreager-FIRL)
W77-02606

**IMPROVING DESIGN CRITERIA FOR SEPTIC TANK SYSTEMS,**
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-02621

**THE ENVIRONMENTAL FATE OF SELECTED POLY-NUCLEAR AROMATIC HYDROCARBONS,**
Stanford Research Inst., Menlo Park, Calif.
S. B. Radding, T. Mill, C. W. Gould, D. H. Liw, and H. L. Johnson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 948, Price codes: A07 in paper copy, A01 in microfiche. Report EPA-560/5-75-009, February, 1976, 122 p., 31 tab., 278 ref.

Descriptors: *Organic compounds, Environmental effects, *Reviews, *Bibliographies, *Public Health, *Thermal power plants, Chemicals, Biochemistry, Aquatic habitat, Ecology, *Toxicity, Algae, Bacteria, Invertebrates, Fish, Birds, Mammals, Aquatic organisms, Plants, Ozone.
Identifiers: *Polynuclear aromatic hydrocarbons, *Environmental persistence, *Benzopyrene, *Benzarthracene, *Phenanthraquinone.

A review of the recent literature on polynuclear (polycyclic) aromatic hydrocarbons (PAH) has been carried out for general information on PAH and specific details about six selected PAH. The sources, transport, chemical and physical transformation, structure-reactivity relationships, and biological (non-carcinogenic) properties have been reviewed with recommendations for further research. Information is derived from a review of 278 literature references. (Katz)
W77-02625

**LITERATURE STUDY OF SELECTED POTENTIAL ENVIRONMENTAL CONTAMINANTS, ANTIMONY AND ITS COMPOUNDS,**
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5C.
W77-02629

**ANALYSIS AND CONTROL OF THERMAL POLLUTION (178) TRAINING MANUAL,**
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Programs Operations.
J. R. Hyland.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-237 617, Price codes: A09 in paper copy, A01 in microfiche. Report EPA-430/1-74-010, August, 1974. 225 p, 90 fig, 200 ref.

Descriptors: *Temperature, *Thermal pollution, *Thermal stress, Thermal water, Water pollution effects, Water temperature, Aquatic environment, Cooling water, Biological effects, Monitoring, Bibliographies, Environmental effects, Environmental engineering.
Identifiers: *Training manual, *Training programs, Temperature prediction, Thermal pollution sources.

Training course manual with 31 outlines concerning thermal pollution. Topics included are: sources of thermal pollution; effects on various organisms; physical and chemical changes from temperature; monitoring techniques; temperature prediction theories; heat dissipation; thermal-pollution control methods. References are included on each topic. (Katz)
W77-02632

**CADMIUM IN THE ENVIRONMENT - III: A TOXICOLOGICAL AND EPIDEMIOLOGICAL APPRAISAL,**
Karolinska Institutet, Stockholm (Sweden).
L. T. Friberg, T. Kjellstrom, G. Nordberg, and M. Piscator.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 115, Price codes: A10 in paper copy, A01 in microfiche. Report EPA-650/2-75-049, June, 1975. 110 p, 32 fig, 18 tab, 233 ref.

Descriptors: *Review, *Bibliography, *Cadmium, *Water pollution, Biochemistry, Pathology, Physiology, *Toxicity, Metabolism, Biological properties, Analytical methods, Public health, Water pollution sources.
Identifiers: Daily intake(Cadmium), *Cadmium analysis, Tissue analysis, Water analysis, Daily uptake, Cadmium excretion, Metallothionein, Pathological effects on humans, Itai-Itai.

A review is presented of the biomedical literature regarding cadmium. The major part of the material covered is published before 1973 to 1975. Subjects discussed are the problems of analysis in air, water and biological substances, possible routes of exposure, metabolism transport, distribution and excretion of cadmium. The effects of cadmium in biological systems is explored. (See also W74-12492 and W72-08062) (Katz)
W77-02633

**THE MANUFACTURE AND USE OF SELECTED ALKYLTIN COMPOUNDS, TASK II,**
Midwest Research Inst., Kansas City, Mo.
T. W. Lapp.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 819, Price codes: A07 in paper copy, A01 in microfiche. Final Report, April 2, 1976, EPA Contract No. 68-01-2687, MRI Project No. 3955-C. Report EPA 560/6-76-011, 122 p, 22 tab, 10 ref.

Descriptors: Water pollution, Surveys, *Waste water treatment, *Industrial wastes, *Antifouling materials, Public health, Costs, *Economic feasibility, Industries, Prices, Metals, Chemical industries, Chemical wastes, Environmental effects, Economic impact, Catalysts.
Identifiers: Tin, *Organometallic compounds, *Tin organic compounds, Production methods,

*Biocides, Antifouling coatings, *Alkytin compounds.

The purposes of this study were to identify the production methods, importation, exportation, use patterns, and exposure to man and the environment for selected alkyltin compounds from 1965 to 1974. For this study, only organotin compounds having alkyl groups with eight carbon atoms or less attached to the tin were considered. Data for the production methods included the specific process, raw materials, annual production quantities, major manufacturers, waste products, environmental management of process wastes, and other production data. Use patterns were identified and annual consumption data were compiled for each compound in the respective areas of utilization. Major consumers in each use area were identified. Various possible methods for the exposure of man and the environment to alkyltin compounds were discussed and evaluated. Future production quantities and areas of usage were estimated for the next 10 years. (Katz)
W77-02634

**MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. VANADIUM.**
National Research Council, Washington, D. C. Committee on Biologic Effects of Atmospheric Pollutants.
For primary bibliographic entry see Field 5C.
W77-02637

**ASPECTS OF CARBON METABOLISM IN FILAMENTOUS MARINE FUNGI,**
Florida Atlantic Univ., Boca Raton. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W77-02638

**ENVIRONMENTAL POLLUTION IN THE NEW LEAD BELT, (RANN UTILIZATION EXPERIENCE, CASE STUDY NO. 2),**
Missouri Univ., Rolla.
R. G. Wixson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 246, Price codes: A02 in paper copy, A01 in microfiche. Report NSF-RA-G-75-030, 1975. 23 p., 1 fig., 29 ref.

Descriptors: *Lead, *Metals, *Public Health, *Mine wastes, *Forests, *Timber management, Pollutants, *Mining, Mills, *Mineral industry, Ecosystem, *Deciduous forests, Forest soils, Missouri.
Identifiers: *New Lead Belts(Mo), Lead mining, *Lead mining industry, Southeastern Missouri, *Lead smelting, Heavy metal contamination.

The rapid development of the lead mining industry in the 'New Lead Belt' of southeastern Missouri caused serious concern as to the effects of lead mining activities on the surrounding virgin forest ecosystem. The objectives of this research are to examine the extent and causes and effects of heavy metal contamination from lead mining and smelting on the surrounding forest, and to develop information for state and federal agencies so that appropriate corrective action could be taken. This project is a good example of a well-utilized research program having significant value to industry, government, and to the public. The project study team served as a catalyst, bringing together industry and regulatory agencies in a cooperative effort to understand and solve a potentially serious problem. (Katz)
W77-02639

**INVESTIGATION OF SELECTED POTENTIAL ENVIRONMENTAL CONTAMINANTS: HALOETHERS,**
Syracuse Univ. Research Corp., N. Y., Life Sciences Div.
For primary bibliographic entry see Field 5C.
W77-02643

**ADSORPTION OF COPPER AND COBALT FROM FRESH AND MARINE SYSTEMS,**
Rhode Island Univ., Kingston. Graduate School of Oceanography.
T. P. O'Connor, and D. R. Kester.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A021 602, Price codes: A02 in paper copy, A01 in microfiche. Geochimica et Cosmochimica Acta, Vol 39, p 1531-1543, 1975. 5 tab, 16 fig, 35 ref.

Descriptors: Water quality, *Metals, *Path of pollutants, *Copper, *Cobalt, Adsorption, Chemical properties, *Anion adsorption, Liquid wastes, Surfaces, Methodology, Acidity, Hydrogen ion concentration, *Illite, Ion exchange.
Identifiers: Solid phase concentration, Ionic strength, Ligands, Cobalt ions, Magnesium ions, Complexing ligands.

The adsorption of copper and cobalt from aqueous solution on to illite and other substrates has been studied as a function of pH, solution composition and solid phase concentration. The results are interpreted in terms of a model whereby the trace metals are adsorbed in exchange for surface bound H+ ions. Adsorption varies with solution ionic strength and the concentrations of complex forming ligands; both of these parameters tend to reduce the trace metal adsorption. The Cu2+ is two orders of magnitude more reactive toward solid surfaces than Co2+, which is consistent with the general reactivities of these two metal ions. It is also found that Mg2+ interferes with adsorption, presumably by competing with the trace metals for the surface sites. A quantitative model was developed which describes adsorption of these metals from natural waters ranging from river water to sea water as a function of pH, complexing ligands and magnesium activity. (Katz)
W77-02645

**DISTRIBUTIONS AND NATURAL LEVELS OF RELATED METALS IN A TROPHIC PATHWAY,**
Allied Chemical Corp., Idaho Falls, Idaho.
J. D. Lemons, and G. S. Kennington.
ERDA Idaho National Engineering Laboratory, Idaho Falls, Report ICP-1095, UC-11, June, 1976, 50 p, 6 tab, 10 fig, 77 ref.

Descriptors: *Metals, *Path of pollutants, Alkaline earth metals, Alkaline soils, *Lead, Soil contamination, Soil chemistry, Soil analysis, Soil science, *Path of pollutants, Physiology, Calciuum, *Calcium compounds, *Food chains, *Food habits, Spectroscopy, Trophic level.
Identifiers: *Trophic pathway, Stomach contents, Animal tissue.

Attempts were made to place the abundance of non-essential metals in a context of chemically similar metals of the same periodic table group. This information would be useful because the increased knowledge of metal pollution for herbivores would be provided. Data developed shows that non-essential and toxic metals are discriminated against relative to their chemically related nutritious metal, as the metals are transferred through the trophic pathway levels. (Katz)
W77-02646

**MOLYBDENUM: A TOXCOLOGICAL APPRAISAL,**
Karolinska Institute, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 5C.
W77-02647

**SUMMARY OF GROUND-WATER QUALITY IMPACTS OF URANIUM MINING AND MILLING IN THE GRANTS MINERAL BELT, NEW MEXICO,**
Office of Radiation Programs, Las Vegas, Nev.
R. F. Kaufmann, G. G. Eadie, and C. R. Russell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 282, Price codes: A05 in paper copy, A01 in microfiche. Technical Note, ORP/LV-75-4, August, 1975, 70 p, 9 tab, 11 fig, 34 ref.

Descriptors: *Groundwater, *Water pollution, *Hydrogeology, *Radioactivity, Waste disposal, *Uranium radioisotopes, *Waste water disposal, *Injection wells, Radioactive wastes, *Public health, Mining, *Mine wastes, *New Mexico.
Identifiers: *Uranium, Natural radioactivity, Radium, Uranium mining, Uranium milling, Tailings.

Ground-water contamination from uranium mining and milling results from the infiltration of radium-bearing mine, mill, and ion-exchange plant effluents. Radium, selenium, and nitrate were of most value as indicators of contamination. In recent years, mining has increased radium in mine effluents from several picocuries/liter (pCi/l) or less, to 100-150 pCi/l. the shallow aquifer in use in the vicinity of one mill was grossly contaminated with selenium, attributable to the mill tailings. Seepage from two other mill tailings ponds averaged 674 x 10 to the 6th power liters/year and, to date, has contributed an estimated 1.1 curies of radium to ground water. At one of these, an injection well was used to dispose of over 3400 x 10 to the 6th power liters of waste from 1960-1973. The wastes have not been properly monitored and have apparently migrated to more shallow potable aquifers. No adverse impacts on municipal water quality in Paguate, Bluewater, Grants, Milan, and Gallup were observed. No correlation was found between gross alpha greater than 15 pCi/l and radium-226 in excess of 5 pCi/l. (Katz)
W77-02648

**PROCEEDINGS OF: NATIONAL CONFERENCE ON HEALTH, ENVIRONMENTAL EFFECTS, AND CONTROL TECHNOLOGY OF ENERGY USE.**
Environmental Protection Agency, Washington, D. C. Office of Energy, Minerals and Industry.
For primary bibliographic entry see Field 5G.
W77-02649

**MONITORING WESTERN ENERGY RESOURCE DEVELOPMENTS,**
Environmental Monitoring and Support Lab., Las Vegas, Nev.
For primary bibliographic entry see Field 5G.
W77-02651

**ATLANTIC OUTER CONTINENTAL SHELF ENERGY RESOURCES: ECONOMIC IMPLICATIONS FOR LONG ISLAND,**
Cornell Univ. Agricultural Experiment Station, Ithaca, N. Y. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6G.
W77-02664

**HISTORY OF OCEAN DUMPING IN THE GULF OF MEXICO,**
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W77-02668

**THE INTERACTION OF WAVES AND OIL SPILL,**
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
R. J. Stewart.
Sea Grant Program Report No. MITSG-75-22, Index No. 75-322-Nwg, September 15, 1976. 203 p, 19 fig, 31 reg, 2 append. SG 04-5-158-1.

Descriptors: *Oil spills, *Oil pollution, *Ocean waves, *Interfaces, *Oil-water interfaces, Waves(Water).
Identifiers: Interfacial elasticity, *Mass transport, Monolayer problems, Asymptotic expansions, Sea Grant Program.

The combined effects of interfacial elasticity and multiple fluid layer geometrics upon the first order properties of surface waves are analyzed for application to the oil spill problem. The technique of matched asymptotic expansion is used in conjunction with a small amplitude assumption regarding the wave height. The theory of interfacial elasticity is briefly reviewed, and critical parameters are identified. Recommendations for further study of oil-water adsorption and mixed monolayer elasticities are developed. The second order mass transport properties are discussed in light of the first order solutions. It is concluded that the enormous potential of this system for significant variation in the first order properties makes further theoretical analysis highly dependent upon the availability of suitable experimental data to direct the theoretician. (NOAA)
W77-02669

**SEDIMENT DISPERSAL PATTERNS AS CLUES TO PLACER-LIKE PLATINUM ACCUMULATION IN AND NEAR CHAGVAN BAY, ALASKA,**
Wisconsin Univ., Madison. Marine Research Lab.
R. M. Owen, and J. R. Moore.
Sea Grant College Reprint No. WIS-SG-76-360 reprinted from: Proceedings of Offshore Technology Conference, Paper No. OTC 2453. May 1976. 14 p, 5 fig, 23 ref.

Descriptors: *Bays, *Alaska, *Sediments, *Placer mining, *Sediment transport, Provenance, Mining, Geochemistry, Metals, Resources, Dispersion, *Path of pollutants.
Identifiers: *Platinum, *Dispersal patterns, *Chagvan Bay(AK), Bering Sea, Mineral deposits.

The modern sediments of Chagvan Bay, Alaska contain zones of platinum enrichment which suggest an external source of platinum-host sediments. Two mathematical sediment tracing techniques, based on vector and multiple regression analyses of geochemical data, are used to determine the provenance and dispersal patterns of the bay deposits. Criteria for the selection of natural sediment tracers are presented, and the application of tracing techniques to the exploration for high latitude marine placers is discussed. (NOAA)
W77-02681

**SCANNING THERMAL PLUMES,**
Wisconsin Univ., Madison. Marine Studies Center.
For primary bibliographic entry see Field 5A.
W77-02682

**EFFECTS OF BALED SOLID WASTE DISPOSAL IN THE MARINE ENVIRONMENT--A DESCRIPTIVE MODEL,**
New Hampshire Univ., Durham. Dept. of Earth Sciences.
T. C. Loder.
Sea Grant Reprint No. UNH-SG-JR-100, 1975 Reprinted from ACS Symposium Series, No 18, Marine Chemistry in the Coastal Environment, 1975. 21 p, 5 fig, 6 tab, 40 ref. SG-2-35244. UNH No. 10230372.

Descriptors: *Waste disposal, *Water quality, *Environmental effects, Solid wastes, Municipal wastes, Mathematical models, *Path of pollutants.
Identifiers: *Marine environment, *Ocean dumping, Ocean environments, Baled wastes.

Compacted experimental bales of municipal solid waste (trash) have been immersed in seawater for several years and monitored for chemical, biological and physical changes. This experimental data is used to develop a descriptive and simple mathematical model for a commercial-sized disposal operation on the continental shelf or deep water off the shelf, handling the needs of a medium-sized coastal city. Factors considered in the model include: bale size; quantity per unit time; bale composition; packaging; areal extent of dump; depth; biota; current regime; decomposition rates; and the effects on water quality such as oxygen consumption, dissolved organics, nutrients, and hydrogen sulfide. The effects of a dumpsite on bottom water quality at the end of one year are calculated for a shallow and deep site for the 'average-most likely' dump and plausible extremes of the above variables. (NOAA)
W77-02683

**PROBABILISTIC TRAJECTORY ASSESSMENTS FOR OFFSHORE OIL SPILLS IMPACTING LONG ISLAND,**
Massachusetts Inst. of Tech., Cambridge.
P. J. Stewart, and J. W. Devannoy, III.
Report to Nassau-Suffolk Planning Board, Regional Marine Resources Council, November 15, 1974. 35 p, 9 fig.

Descriptors: *Oil spills, *Oil pollution, *Water pollution sources, *Winds, *Ocean currents, New England, *New York, Beaches, Coasts, Shores, Seasonal, Ocean circulation.
Identifiers: Outer Continental Shelf, *Long Island(NY), Nantucket Shoals, Wind fields, Trajectories.

This study has shown that under the presumed current and wind fields, it is reasonable for Long Island to anticipate that some spills from the Nantucket Shoals region will beach upon her shores given a sufficient number of such events. In particular, it appears that the probability of a spill beaching on Long Island given that it originated on Nantucket Shoals is on the order of .05 in the summer and perhaps .01 or less in the winter. The times to shore for spills from this area appear to be in the thirty- to forty-day range on the average, and the minimum is around twenty days. These predictions are somewhat at variance with our previous results, but this can be explained by the differences in the wind field specifications. (NOAA)
W77-02689

**MARYLAND UPLANDS NATURAL AREAS STUDY. VOL I: EASTERN SHORE,**
Rogers and Golden, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 2L.
W77-02690

**PERSISTENCE OF POLYCHLORINATED BIPHENYLS IN THE HARD-CLAM (MERCENARIA MERCENARIA) AND THE EFFECT UPON THE DISTRIBUTION OF THESE POLLUTANTS IN THE ESTUARINE ENVIRONMENT,**
London Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W77-02703

**LEAD UPTAKE IN TWO MARINE PHYTOPLANKTON ORGANISMS,**
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5C.
W77-02708

**DDE AND LINDANE IN A LARGE-SCALE MODEL LENTIC ECOSYSTEM,**
Purdue Univ., Lafayette, Ind. Dept. of Forestry.
For primary bibliographic entry see Field 5C.
W77-02713

**COMPARISON OF 115M CD ACCUMULATION FROM SEDIMENTS AND SEA WATERS BY POLYCHAETE WORMS,**
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
T. Ueda, R. Nakamura, and Y. Suzuki.
Bulletin of the Japanese Society of Scientific Fisheries, Vol. 42(3), p 299-306, 1976. 2 tab., 5 fig., 20 ref.

Descriptors: *Metals, *Cadmium, *Marine pollution, *Path of pollutants, *Sediments, *Benthic organisms, Invertebrates, Annelids, Bottom sediments, Water quality, Sea water, Industrial wastes, Algae.
Identifiers: Concentration factors, 115m-Cd, Marine sediments, *Polychaete worms, Cadmium accumulation, Cadmium activity ratios.

To know the role played by marine sediments in influencing the fate of discharged metals, (1) the interaction of metals between sediments and deposit-feeder marine worms (Nereis japonica), and (2) uptake and excretion of metals by worms were examined by laboratory experiments using 115m-Cd. Worms directly in contact with 115m-Cd-sediments accumulated 115m-Cd six times more rapidly than worms that were not in contact with the 115m-Cd sediments during the 8 days of experimentation. Comparing the concentration factor of 22 (from sea water) with accumulation from sediments, it was assumed that 115m-Cd in sediments would give the effect of 1/200 to the accumulation of 115m-Cd by worms in sea water to the accumulation of 115m-Cd. Further, to simulate these results close to that occurring in the natural ecosystem, the distribution of 115m-Cd in sea water, sediments and alga were also examined by means of a curve analysis of the distribution pattern by a three compartment model. It proved that the activity ratios of 115m-Cd were 9 for sediments and 21 for alga, which was similar to 22 for worms. (Katz)
W77-02717

**BIOSYNTHESIS OF ORGANIC ARSENIC COMPOUNDS IN BROWN TROUT (SALMO TRUTTA),**
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 5C.
W77-02719

**AQUEOUS AMMONIA EQUILIBRIUM CALCULATIONS: EFFECTS OF PH AND TEMPERATURE,**
Montana State Univ., Bozeman. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W77-02720

**STUDIES ON THE CHEMICAL BEHAVIOR OF 106-RU IN SEA WATER AND ITS UPTAKE BY MARINE ORGANISMS -I, ACCUMULATION AND EXCRETION OF 106-RU BY CLAM,**
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
For primary bibliographic entry see Field 5C.
W77-02722

**SOME ENVIRONMENTAL AND TOXICOLOGICAL ASPECTS OF TRI-ARYL PHOSPHATE SYNTHETIC OIL,**
For primary bibliographic entry see Field 5C.
W77-02724

**CHLORINE-CONTAINING STABLE ORGANICS: NEW COMPOUNDS OF ENVIRONMENTAL CONCERN,**
For primary bibliographic entry see Field 5C.
W77-02727

**BIOACCUMULATION OF MERCURY IN MYOXOCEPHALUS QUADRICORNIS (L.) (TELEOSTEI, COTTIDAE) IN AN UNPOLLUTED AREA OF THE BALTIC,**
Helsinki Univ. (Finland). Dept. of Environmental Science.
For primary bibliographic entry see Field 5C.
W77-02731

**THE EFFECTIVENESS OF THE FINNISH ANTI-MERCURY MEASUREMENTS IN THE MODERATELY POLLUTED AREA OF HAMEENKYRO, (IN FINNISH),**
Helsinki Univ. (Finland). Dept. of Environmental Science.
For primary bibliographic entry see Field 5C.
W77-02733

**POLYHALOGENATED MONOTERPENES FROM THE RED ALGA, PLOCAMIUM CARTILAGINEUM,**
Scripps Institution of Oceanography, LaJolla, Calif.
For primary bibliographic entry see Field 5C.
W77-02734

**WINTER RUNOFF FROM AN URBAN CATCHMENT, (JANUARY TO MARCH 1974),**
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02739

**STORM WATER MANAGEMENT MODEL STUDY, VOLUME I.**
MacLaren (James F.) Ltd., Toronto (Ontario); and Proctor and Redfern, Toronto (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No 47, Environmental Protection Service, Environment Canada, Ottawa, Canada, September 1976, 295p., 100 fig., 32 tab, 123 ref. 73-5-10.

Descriptors: *Storm water, *Model studies, Canada, Watersheds(Basins), Water management(Applied), Data collections, Snowmelt, Runoff.
Identifiers: Storm Water Management Model(SWMM), Submodels.

Final results and conclusions of a study of storm water management models are described. Objectives were: to review and modify the U.S. Environmental Protection Agency's Storm Water Management Model (SWMM) for Canadian conditions; to select and modify a submodel for the simulation of quantity and quality of runoff resulting from snowmelt; to develop a data analysis submodel capable of extracting the SWMM meteorological data input from existing data banks; and, to select and modify a high-speed model for simulation of frequency of discharges and overflows, capable of using output from the data analysis submodel as input. This study has expanded the capabilities of the original SWMM. Methods of aggregating the properties of individual subcatchments into a single equivalent catchment are described which can lead to a considerable reduction in data preparation and computer processing time. A generalized quality model was developed, based on SWMM equations and using the simplications obtained in the aggregating techniques. Snowmelt quantity and quality models have been integrated with the SWMM. Methods of interfacing the SWMM and STORM (U.S. Army Corps of Engineers) models have been discussed and demonstrated, and a fully operational package of models, capable of simulation of all spects of storm water flow and quality, has been prepared for application to Canadian conditions. (See also W77-02744) (Environment Canada)
W77-02743

**STORM WATER MANAGEMENT MODEL STUDY, VOLUME II.**
MacLaren (James F.) Ltd., Toronto (Ontario); and Proctor and Redfern, Toronto (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No 48, Environmental Protection Service, Environment Canada, Ottawa, Canada, September 1976, 148p., 8 fig., 34 tab, 127 ref. 73-5-10.

Descriptors: *Storm water, *Model studies, Snowmelt, Runoff, Research and development, Publications, Urban runoff, Water quality, Water quantity, Data collections, Waste water treatment.
Identifiers: *Storm Water Management Model(SWMM).

Supplementary technical material used in preparing the final report is described. Comparative analyses of six storm water routing models and four water quality models are described. Literature surveys are included for material dealing with urban runoff quality and snowmelt quantity and quality. Sources of data required for storm water modelling have been assessed, and study areas in Canada and the U.S. are described. A summary of the treatment processes available in the U.S. Environmental Protection Agency's Storm Water Management Model (SWMM) is given, and current literature and modifications to the treatment model are described. (See also W77-02743) (Environment Canada)
W77-02744

**INSTRUMENTATION FOR FIELD STUDIES OF URBAN RUNOFF,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02749

**LEVELS OF ARSENIC AND SELENIUM IN THE GREAT LAKES REGION,**
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 5A.
W77-02751

**ASBESTIFORM FIBRE LEVELS IN LAKES SUPERIOR AND HURON,**
Canada Centre for Inland Waters, Burlington (Ontario).
R. W. Durham, and T. Pang.
Inland Waters Directorate, Scientific Series No 67, 1976. 12 p, 5 fig, 5 tab, 9 ref.

Descriptors: *Asbestos, *Lake Superior, *Lake Huron, Lakes, Aquatic environment, Rivers, Mining, Sampling, Water analysis, Potable water, Great Lakes, Minnesota, Water pollution sources, Pollutant identification.
Identifiers: *Asbestiform fibres(Mineral), Concentrations, Silver Bay(Minn), Georgian Bay.

Asbestiform fiber concentrations from less than 0.1 million to 87.3 million per litre were measured in the open waters of Lake Superior during 1973. The most commonly occurring mineral fiber was chrysotile, although fibers of the amphibole mineral commingtonite were found in the western arm of Lake Superior near the Reserve Mining tailings dumping site at Silver Bay, Minnesota. The results suggest that the zone of influence of this dumping of asbestiform fibers does not extend far out into the lake and that it decreases from June through November. Rivers flowing into Lake Superior which were analyzed all had low chrysotile fiber concentrations below 8 million per litre, as did samples taken in spring 1974 from Lake Huron and Georgian Bay. (Environment Canada)
W77-02753

**URBAN HYDROLOGICAL MODELING AND CATCHMENT RESEARCH IN CANADA,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2A.
W77-02754

**BEHAVIOUR OF OIL SPILLED IN ICE-COVERED RIVERS,**
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
E. C. Chen, B. E. Keevil, and R. O. Ramseier.
Scientific Series No. 61, 1976, 34p., 4 app., 14 fig., 3 tab, 27 ref.

Descriptors: *Oil spills, *Ice, Ice cover, Rivers, Behavior, Oil-water interfaces, Drops(Fluids), River flow, Pipelines, Crude oil, Cold Regions, Canada, Path of pollutants, Oil pollution, Water pollution sources.
Identifiers: Ice-water interfaces, Oil slick, Thermal effects, Northern Canada.

Experiments were carried out in a cold room at -15C to investigate the behavior of Norman Wells crude oil spilled under freshwater ice. The oil, when released in water under ice, separates into droplets and rises to the ice-water interface where the oil drops coalesce to form a slick. The spreading of oil under ice is complicated by the coalescence of oil drops at the interface. In calm waters, the radius of the oil slick under ice is approximately proportional to 0.25 power of the elapsed time. In turbulent waters, however, the oil drops travel some distance, following the flow direction of water, before reaching the interface. Some of the small drops are suspended and dispersed in the water column. The slick formed at the ice-water interface does not adhere to the ice and contains some water-in-oil emulsions. If the oil is spilled under the ice and the ice continues to grow, the oil will be sandwiched between the ice layers. An oil lens trapped between the ice layers acts as an insulator and increases the temperature drop across the ice. The behavior of accidental oil spills in Canadian rivers was surveyed and analyzed. Observations of these accidental spills show that the oil, when spilled in a river, is quickly dispersed downstream. (Environment Canada)
W77-02760

**SELECTION CRITERIA AND LABORATORY EVALUATION OF OIL SPILL SORBENTS.**
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W77-02769

**NTA (NITRILOTRIACETIC ACID) - AN ECOLOGICAL APPRAISAL,**
Environmental Protection Service, Ottawa (Ontario).
A. Prakash.
Economic and Technical Review Report EPS 3-WP-76-8, November 1976. 45 p, 1 fig, 85 ref, 2 tab, append.

Descriptors: *Nitrilotriacetic acid, Aquatic environment, Biodegradation, Detergents, Sewage treatment, Risks, Temperature, Projections, Potable water, Algae, Fish, Environmental effects, Water pollution effects, Ecology.
Identifiers: Receiving waters, Removal, NTA-metal complexes.

Environmental aspects of NTA are emphasized; an assessment is included of the ecological distribution and effects of NTA in the aquatic ecosystem, based on data from field monitoring and laboratory and pilot scale studies in Canada and the United States. Factors affecting biodegradability of NTA in the recipient environment, and current and projected environmental levels of NTA are discussed. General effects of increased amounts of NTA on aquatic ecosystems

and specific effects on algae, invertebrates and fish are reviewed. Adequate safety margins exist between anticipated NTA levels in the environment and those which are likely to produce deleterious ecological effects; and continued vigilance is recommended in certain special situations where a potential for cumulative build-up of NTA may exist. (Environment Canada)
W77-02770

**EFFECTS OF PULPWOOD HARVESTING ON THE QUALITY OF STREAM WATERS OF FOREST CATCHMENTS REPRESENTING A LARGE AREA IN WESTERN ALBERTA, CANADA,**
Northern Forest Research Center, Edmonton (Alberta).
T. Singh, Y. P. Kalra, and G. R. Hillman.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 21-27, 1974. 2 tab, 9 ref.

Descriptors: *Forest watersheds, *Water quality, *Forest management, *Canada, Lumbering, Watersheds(Basins), Nutrients, Runoff, Lodgepole pine trees, On-site investigations, Data collections, Demonstration watersheds, Trees, Coniferous trees, Pulp and paper industry.
Identifiers: *Alberta(Canada).

The effects of pulpwood harvesting on water quality are being studied by the Canadian Forestry Service. The study reported was conducted from 11 May to 28 June 1973 on a pulp lease area (7770 sq km) in Western Alberta. Thirteen catchments in three working circles were selected, seven represented the undisturbed condition whereas the remaining six had been partially logged during the past ten years. Analysis of variance showed no significant difference in the concentration of cations between treated and untreated catchments. The long-term effects of pulpwood harvesting were not significantly different from the natural erosion of nutrients from undisturbed forests. (See also W77-02771) (Humphreys-ISWS)
W77-02774

**THE EFFECT OF AGRICULTURE ON THE SURROUNDINGS OF LAKE BALATON,**
University of Agriculture, Keszthely (Hungary).
A. Toth, and Z. Fekete.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, 36-39, 1974. 1 fig, 4 tab, 3 ref.

Descriptors: *Water pollution sources, *Lakes, *Agriculture, Water quality, Shallow water, Soil erosion, Farm management, Farms, Cultivation, Cultivated lands.
Identifiers: *Hungary, *Lake Balaton(Hungary).

The influence of agriculture on man's environment in the basin of Lake Balaton was studied. It was ascertained that the pollution of the lake stems primarily from soil erosion, and that deep ploughing and contour cultivation diminish erosion and pollution to a large extent. Plant nutrient losses were calculated from measurements taken over a 10-year period. The polluting effects of fertilizing and plant protection were also examined. It was noted that animal husbandry pollutes the waters; water plants in the lake quickly multiply due to the influence of sewage; soil pollution in the health resorts is rendered harmless by a high humus content. (See also W77-02771) (Humphreys-ISWS)
W77-02776

**THE ROLE OF FOREST STANDS IN THE CONTROL OF EROSION PROCESSES AND OTHER NEGATIVE NATURAL PHENOMENA,**
For primary bibliographic entry see Field 4D.
W77-02785

**A SIMPLE DISPERSION MODEL OF THE MEAN CONCENTRATION FIELD IN THE WESTERN AND CENTRAL BASINS OF LAKE ERIE,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W77-02795

**OBSERVATIONS OF THE KELVIN-HELMHOLTZ INSTABILITY IN LABORATORY MODELS AND FIELD EXAMPLES OF THERMAL PLUMES,**
Old Dominion Univ., Norfolk, Va. School of Engineering.
For primary bibliographic entry see Field 2H.
W77-02796

**CONTAMINANTS IN THE NEW YORK BIGHT,**
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Program.
J. A. Mueller, A. R. Anderson, and J. S. Jeris.
Journal of the Water Pollution Control Federation, Vol 48, No 10, p 2309-2326, October 1976. 12 fig, 6 tab, 40 ref. NOAA-04-4-002-35.

Descriptors: *Water pollution sources, *Pollutants, *Wastes, *New York, *Waste disposal, Water pollution, Water quality, Waste water(Pollution), Organic matter, Fallout, Drainage effects, Surface water, Drainage, Coasts, Runoff, Gaging stations, Urban runoff, Surface runoff, Ecosystems, Gages, Heavy metals, Municipal wastes.
Identifiers: *Coastal zones, *New York Bight, Barge dumps, Microbes, Coastal waters, Dredge spoils.

This paper presented an estimate of the location and magnitude of contaminant inputs into the New York Bight, indicated their relative importance, and identified data gaps. Four sources of contaminant inputs were evaluated in the study: barge dumps, atmospheric fallout as direct Bight inputs, wastewater, and runoff as coastal inputs to waters ultimately draining to the Bight. For each source, in addition to flow or volume, recent data on 23 separate contaminants obtained from numerous agencies were used to estimate the inputs of solids, organic matter, nutrients, heavy metals, and microbes. A summary of the contribution by source and location was presented as well as an estimate of the annual or seasonal variability for selected sources. To evaluate the significance of the mass loads generated in the study, they were compared with an estimate of the background mass loads entering the Bight as a result of a net current across the ocean boundaries. (Henley-ISWS)
W77-02799

**A BENTHIC SURVEY OF FLAT CREEK AND THE SALT RIVER NEAR THAYNE, WYOMING.**
Environmental Protection Agency, Denver, Colo. Technical Support Branch.
For primary bibliographic entry see Field 5C.
W77-02807

**SPATIAL AND TEMPORAL VARIATIONS IN THE INTERSTITIAL WATER CHEMISTRY OF CHESAPEAKE BAY SEDIMENTS,**
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 5C.
W77-02808

**ON THE HABITABILITY OF MARS, AN APPROACH TO PLANETARY ECOSYNTHESIS.**
Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 6G.
W77-02810

**THE EFFECT OF DISSOLVED ORGANIC MATTER IN SEA WATER ON THE UPTAKE OF MIXED INDIVIDUAL HYDROCARBONS AND NUMBER 2 FUEL OIL BY A MARINE FILTER-FEEDING BIVALVE (MERCENARIA MERCENARIA),**
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5C.
W77-02817

**CHEMICAL AND PHOTOCHEMICAL TRANSFORMATION OF SELECTED PESTICIDES IN AQUATIC SYSTEMS,**
Environmental Research Lab., Athens, Ga.
For primary bibliographic entry see Field 5C.
W77-02822

**ANALYSIS OF EMISSIONS FROM OUTBOARD TWO CYCLE MARINE ENGINES,**
Michigan Univ., Ann Arbor.
W. J. Weber, Jr, D. E. Cole, and J. C. Posner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 174, Price codes: A12 in paper copy, A01 in microfiche. Report No. EPA-670/2-75-061, June 1975. 249 p. 120 fig,m 37 tab., 34 ref., 2 append. 1BB038. R-801799.

Descriptors: *Water pollution sources, Boating, Lakes, *Analytical techniques, Gasoline, Toxicity, Oil wastes, Fishkill, Laboratory tests, Organic compounds, Pollutant identification.
Identifiers: *Outboard engines, Two cycle engines, Crankcase oil, Emissions, Exhaust.

The outboard engine was assessed as a source of environmental pollution with particular emphasis on the aquatic ecosystem in small lake systems. A wide variety of two-stroke engines were run under load conditions and both condensable and non-condensable emissions analyzed in this laboratory based study. The effect of a 'tune up' on emissions was also examined and found to have little impact. Crankcase drainage constituted a small fraction of the total hydrocarbons emitted, and consisted of 10-15 times more oil than the fuel mixture. Exhaust products expected to be condensable in a water-column constituted less than 10% of the fuel in all cases, and were usually considerably less. The major portion of the water condensable aromatics had an evaporation half-life of approximately 11 days, though there was a small portion of non-volatile hydrocarbon fraction which was not removed by evaporation. Analytical methods for field study were developed, and the toxicity of both condensed exhaust and individual gasoline compounds to goldfish were determined. This research is one part of a three part study, the other two parts of which involved field studies. (Luedtke-Wisconsin)
W77-02823

**TEMPORAL VARIATIONS IN THE PHOSPHORUS CONTENT OF A NORTHERN DYSTROPHIC LAKE,**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 5C.
W77-02824

**HYDRODYNAMICS-DISPERSION STUDIES IN STORM SEWERS,**
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 8B.
W77-02827

**LANDSCAPE GEOCHEMISTRY AND ENVIRONMENTAL PROBLEMS,**
Brock Univ., St. Catharines (Ontario). Dept. of Geological Sciences.
For primary bibliographic entry see Field 5A.
W77-02849

**BACTERIAL DEGRADATION OF POLYCHLORINATED BIPHENYLS II. RATE STUDIES,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W77-02851

**DISTRIBUTION OF WATER AND IONS IN SOILS IRRIGATED AND FERTILIZED FROM A TRICKLE SOURCE,**
Agricultural Research Organization, Bet Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
For primary bibliographic entry see Field 3F.
W77-02855

**A COMPARATIVE WATER QUALITY ANALYSIS OF SELECTED RECREATION LAKES AND STREAMS IN THE WHITE MOUNTAINS OF ARIZONA,**
Arizona Univ., Tucson. School of Renewable Natural Resources.
J. G. Utter.
Master of Science Thesis, 1975. 151 p, 32 fig, 26 tab, 67 ref.

Descriptors: *Recreation wastes, *Water pollution sources, *Waste disposal, *Camping, Recreation facilities, Water quality, *Arizona, Streams, Lakes, Bacteria, Environment, Water pollution, Streptococcus.
Identifiers: *White Mountains area(Ariz).

This study examines the water quality issue in relation to selected recreation lakes and streams in the White Mountains of Arizona. Four major parameters of water quality were investigated: physical environment factors, chemical nutrient concentrations, fecal bacterial contamination, and visitor use effects. Results indicate intensive recreational use and development may be accompanied by decreased water quality. The research lake exhibiting the most intensive use and development showed significantly greater fecal bacterial contamination in the concentrated use area. Management considerations developed in this report are directed toward assisting recreation land managers in recognizing and preventing present and future water quality problems. (Jamail-Arizona)
W77-02866

**THE POTENTIAL TRACE METAL CONTAMINATION OF WATER RESOURCES THROUGH THE DISPOSAL OF FLY ASH,**
Notre Dame Univ., Ind. Dept. of Civil Engineering.
T. L. Theis.
In: 2nd National Conference on Complete Water Reuse held in Chicago, Illinois, May 4-8, 1975, 19 p, 5 fig, 3 tab, 27 ref.

Descriptors: *Environmental effects, Water resources, *Fly ash, Heavy metals, Water pollution, Water pollution sources, *Metals, Aquatic life, Trace elements.

In an effort to obtain data on trace metals, several fly ashes were gathered from power generating stations and subjected to a micro-elemental analysis. Considerable variability was found but the arsenic and cadmium contents of virtually al the fly ashes were consistently 5-100 times natural abundances while in at least one case all the other metals showed this same degree of excess. The report is concerned with the contact between fly ash and water supplies. Data on te pH, dissolved oxygen, and heavy metal leachate effects on aquatic resources are presented. (Chilton-ORNL)
W77-02873

**THE LOCATION OF INDUSTRIAL WATER USERS AND AIR POLLUTION: AN OVERLOOKED RELATIONSHIP,**
Argonne National Lab., Ill. Energy and Environmental Systems Div.
D. J. Santini.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 670, Price codes: A10 in paper copy, A01 in microfiche. Report NSF-RA-E-75-044 272, June 1975. 11 p, 5 tab, 1 fig. NSF and RANN Nos. AG-352 and GI 32989A2.

Descriptors: *Environmental effects, *Water utilization, *Air pollution, *Industrial water, Industrial plants, Sites, Economic feasibility, Water pollution sources.

The use of water in the production process is responsible for a great deal of concentration of industrial air pollution. For a policy of dispersal of water using air polluting industry to be achievable, the results of the study imply that either adequate water supplies must be provided at alternative locations or water use must be eliminated from the production pocess by technological means such as air cooling and that these means must be economically feasible. The report also indicates that even if these conditions are met that industries are still likely to choose urban locations. (Chilton-ORNL)
W77-02877

**EFFECT OF IRRIGATION ON SOME PROPERTIES OF SOUTHERN CHERNOZEMS, (IN RUSSIAN),**
Moscow State Univ. (USSR). Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W77-02889

**QUALITATIVE COMPOSITION OF IRRIGATION WATER AND SUSPENDED LOAD OF THE ORDZHONIKIDZE IRRIGATION SYSTEM, (IN RUSSIAN),**
T. A. Mamedova.
Izv Akad Nauk Az SSR Ser Biol Nauk 2, p 83-88, 1975.

Descriptors: *Irrigation water, *Irrigation systems, *Nutrients, *Suspended load, Irrigation, Soils, Nitrates, Ammonia, Nitrogen compounds, Nitrogen, Phosphorus, Potassium, Humus.
Identifiers: Ordzhonikidze, USSR. Mil'skii steppe, Kura-Araks, Azerbaijan SSR.

Data are presented from a study of the irrigation waters and their effect on the soils under conditions of the Ordzhonikidze irrigation system of the Mil'skii steppe of the Kura-Araks lowland in the Azerbaijan SSR (USSR). The water of the system are rich in nutrient elements (nitrate and ammonia N, P, humus, K). The suspended load contains 0.21-0.49% total P, and is also rich in available nutrient elements.--Copyright 1976, Biological Abstracts, Inc.
W77-02890

**MEASUREMENTS OF POLYCHLORINATED BIPHENYL (PCB) IN WATER, SEDIMENTS, AND ORGANISMS OF TWO RIVERS IN HIROSHIMA PREFECTURE, (IN JAPANESE),**
Hiroshima Univ. (Japan). Dept. of Fisheries; and Hiroshima Univ. (Japan). Faculty of Fisheries and Animal Husbandry.
For primary bibliographic entry see Field 5A.
W77-02899

**STUDY OF A RELATIONSHIP BETWEEN CHEMICAL AND BACTERIOLOGICAL POLLUTION IN THE COASTAL ZONES, (IN FRENCH),**
CEA Centre de Pierrelatte (France).
For primary bibliographic entry see Field 5A.
W77-02903

**YEASTS AND FUNGI IN MARINE ENVIRONMENTS, (IN FRENCH),**
Centre Hospitalo-Universitaire-Poitiers (France). Lab. of Bacteriology.
J. Briscou.
Bull Soc Fr Mycol Med 4(2), p 159-162, 1975.

Descriptors: *Yeasts, *Marine fungi, Sediments, Mollusks, Fish, Plankton, Coasts, Water pollution sources, Human infection.
Identifiers: *Candida, *Debaryomyces, *Saccharomyces.

The distribution and composition of fungal populations in coastal marine waters are reviewed. They are found in sediments, molluscs, fish intestines and plankton. Plankton serve as a vector for fungi. Common fungi are Candida, Saccharomyces and Debaryomyces. A major health problem is the large number of human intestinal fungi found in polluted coastal waters. Vaginal infections from Candida in women bathing in such waters are increasingly common. Better pollution control and caution by bathers are suggested.--Copyright 1976, Biological Abstracts, Inc.
W77-02904

**THE GENERAL CHARACTER OF THE WATER OF THE MIDDLE OF THE SAALE RIVER, (IN GERMAN),**
D. Floessner.
Limnologica 10(1), p 45-55, 1976.

Descriptors: Rivers, *Water pollution, Sediments, Oxygen, Organic matter, Seasonal, Biochemical oxygen demand, *Oxygen requirements.
Identifiers: Autotrophic population, *Saale River(East Germany), *Saprobity index.

The saprobity index at 6 locations along the river, from Eichicht to Grossheringen (East Germany), was calculated from Feb.-Oct. 1971 at 2 and 4 wk intervals, based on the number and frequency of saprobic organisms, sediment consumption, O2 balance and relative pollution level. This 5 km section of the river is borderline oligo--to beta--mesosaprobic. Biological activity is characterized by a high percentage of autotrophic organisms. An increase in suspended organic matter drastically reduced the autotrophic population during the winter. The calculated BSB5 (biochemical O2 requirement for 5 days per liter of water) was 600 kg O2 for the section between Rothenstein and Maua and 750 kg O2 for the Stoeben-Grossheringen section.--Copyright 1976, Biological Abstracts, Inc.
W77-02910

**METHODS OF BALANCING AND CALCULATING THE O2 BALANCE OF THE MIDDLE COURSE OF THE SAALE RIVER, (IN GERMAN),**
For primary bibliographic entry see Field 5A.
W77-02911

**AMINO ACID AND FRACTIONAL COMPOSITION OF PROTEIN OF THE VEGETATIVE MASS OF CORN AT DIFFERENT LEVELS OF MINERAL NUTRITION AND WATER SUPPLY, (IN RUSSIAN),**
Vsesoyuznyi Nauchno-Issledovatelskii Institut Kormov, Moscow (USSR).
For primary bibliographic entry see Field 2I.
W77-02918

**CARBOHYDRATES AND NITROGENEOUS COMPOUNDS IN A NUMBER OF HIGHER AQUATIC PLANTS AND DYNAMICS OF THEIR CONTENT DURING VEGETATION, (IN RUSSIAN),**
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 2I.
W77-02919

**EFFECTS OF FLOOD FLOWS ON WATER QUALITY OF TIOGA-HAMMOND LAKES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
M. S. Dortch.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 143, Price codes: A03 in paper copy, A01 in microfiche. Technical Report H-76-11, August 1976. 42 p, 5 fig, 15 pl.

Descriptors: *Acidic water, *Alkaline water, *Floods, *Hydraulic models, *Unsteady flow, Water analysis, *Flow, Water quality, *Pennsylvania, Model studies.
Identifiers: *Hammond Lake(Penn), *Tioga Lake(Penn).

The physical model investigation was conducted to estimate the dilution and dispersion of acidic and alkaline substances within Tioga-Hammond Lakes as a result of flood flows and to determine the concentration of these substances in the outflow during drawdown. The model, consisted of Tioga and Hammond Lakes, the connecting channel of the dual reservoir system, Hammond outlet works, and the flood control intakes of Tioga outlet works. The model simulated density variations and stratifications expected to exist in the prototype due to temperature differences and reproduced the unsteady inflow and outflow hydrographs for various size floods. Concentrations of fluorescent dyes simulated the acidic and alkaline substances; water samples were collected and analyzed to determine the dilution and dispersion of the dyes throughout the lakes and in the outflow from the lakes. The expected concentrations of acidic and alkaline substances existing in the two lakes after flood inflows and drawdown and in the outflow during drawdown are presented for three flood conditions. The results provide information for estimating water quality for similar flood conditions within and downstream of the project and guidance for limiting adverse quality during drawdown. (WES)
W77-02931

**BIOLOGICALLY ACTIVE SUBSTANCES OF THE SILT DEPOSITS OF DNIEPER RESERVOIRS, (IN RUSSIAN),**
Akademiya Nauk URSR, Kiev. Instytyt Hidrobiologii.
V. V. Arendarchuk.
Gidrobiol Zh 11(3), p 59-62, 1975.

Descriptors: *Organic compounds, *Silts, *Bottom sediments, *Phenol, Reservoir silting, Reservoirs, Wheat, Plant growth, Waste, Water pollution sources.
Identifiers: Coleoptiles, *Dnieper reservoirs(USSR), *Indoles, USSR.

Bottom Silt deposits in the Dnieper sequence of reservoirs (USSR) contain biologically active substances of an indole and phenol nature. The free indole compounds readily pass from the silt into water. The indole compounds found in the silt deposits stimulated the growth of wheat coleoptiles.--Copyright 1976, Biological Abstracts, Inc.
W77-02934

**COOPER RIVER REDIVERSION PROJECT, BUSHY PARK WATER SUPPLY TESTS; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02939

**FALLS LAKE WATER-QUALITY STUDY; HYDRAULIC LABORATORY INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
B. Loftis, and D. C. Fontane.
Available from the National Technical Information Service, Springfield, Va. 22161, Price codes: A05 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-6, April 1976. 76 p, 2 tab, 13 pl, 10 ref, append.

Descriptors: *Dissolved oxygen, *Intake structures, *Water quality, *Water temperature, *North Carolina, Lakes.
Identifiers: Falls Lake(NC).

A mathematical model was used to simulate the thermal and dissolved oxygen (D.O.) content of the proposed Falls Lake project and to evaluate the adequacy of the proposed multilevel intake structure for satisfying downstream temperature and D.O. objectives. The study indicated that proper operation of the proposed impoundment would result in satisfying the temperature objective. Low D.O. content values are predicted, reflecting the quality of water available for release through the intake structure and outlet works. However, reaeration of flow released through the multilevel outlet works should be sufficient to increase the D.O. content of the downstream release up to or above the desired minimum level of 5 mg/l. (WES)
W77-02941

**FEASIBILITY OF MONITORING FLOW PATTERNS AND SEDIMENT AND POLLUTANT DISPERSION OF WATER BODIES WITH 24-CHANNEL SPECTRAL DATA,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
M. H. Smith.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD/A-025 333, Price codes: A04 in paper copy, A01 in microfiche. Miscellaneous Paper M-76-10, May 1976. 55 p, 24 fig, 3 tab, 2 pl, 6 ref.

Descriptors: *Chesapeake Bay, *Data processing, Pollutants, *Remote sensing, Sedimets, *Sediment transport, *Monitoring, Feasibility studies, *Path of pollutants, Data collections, *Dispersion.

The primary objective of this research effort was to develop data-handling procedures to transform digital data collected by a Bendix 24-channel airborne sensor into radiance values and to produce images free of skew and reflectance geometry distortion. Data collected over the Chesapeake Bay area on 26 October 1972 and 22 April 1973 at approximately 3200 m and later recorded on computer-compatible tapes (CCT) were studied. Special attention was focused on data from the Rappahannock River. The scanner system, including the mechanics, optics, and electronics, is described with an explanation of data formatting on the NASA-generated CCT and the formatting required by existing U.S. Army Engineer Waterways Experiment Station (WES) computer software and programs to handle remotely sensed data, specifically ERTS or LANDSAT CCT data. (WES)
W77-02946

**B. EVERETT JORDAN LAKE WATER-QUALITY STUDY,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
B. Loftis, P. E. Saunders, and J. L. Grace, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A021 682, Price codes: A09 in paper copy, A01 in microfiche. Technical Report H-76-3, February 1976. 193 p, 7 fig, 1 tab, 22 plates, 3 append, 19 ref.

Descriptors: *Hydraulic models, *Mathematical models, *Stratified flow, *Water quality, *Dissolved oxygen, Lakes, *North Carolina.
Identifiers: *B. Everett Jordan Lake(NC), New Hope River(NC), Haw River(NC).

Physical and mathematical models were used to investigate the hydrodynamics of stratified flow within B. Everett Jordan Lake, to predict the temperature and dissolved oxygen (D.O.) regimes of the lake immediately upstream of the dam, and to estimate the temperature and D.O. content of the release. The hydrodynamic phenomena in the lake were significantly influenced by lake geometry, two highway crossings in the New Hope arm of the lake, and the relatively large quantity of flow contributed by the Haw River. The two highway crossings essentially divide the New Hope arm of the lake into three pools. The lower pool is influenced primarily by the Haw River, and the upper pool is influenced only by the New Hope River. The results of the numerical simulations indicate that the multilevel outlet works can be operated such that downstream temperature and D.O. objectives can be satisfied. (WES)
W77-02954

**THE RATE OF MICROBIOLOGICAL OXIDATION OF METHANE DETERMINED WITH THE AID OF LABELED (CARBON-14) METHANE, (IN RUSSIAN),**
S. S. Belyaev, K. S. Laurinavichus, and M. V. Ivanov.
Mikrobiologiya 44(3), p. 542-545, 1975.

Descriptors: *Oxidation, *Microorganisms, *Methane, *Carbon, *Microbiology, Chemical reactions, Lakes, Carbon dioxide, Microbial degradation, Pollutant identification.
Identifiers: Carbon-14, *Mari Lakes(USSR).

About 75-90% of the C from methane (CH4) oxidized by microorganisms was found in CO2, the remainder was incorporated into the microbial cells. The rate of microbiological methane oxidation in the water of the Mari Lakes was 6.4 x 10-3-464.4 x 10-3cm3CH /1 per day.--Copyright 1976, Biological Abstracts, Inc.
W77-02962

**GRAYS HARBOR ESTUARY, WASHINGTON, REPORT 6, 45-FT MSL (40-FT MLLW) NAVIGATION CHANNEL IMPROVEMENT STUDIES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02963

**AN OILSPILL RISK ANALYSIS FOR THE NORTH ATLANTIC OUTER CONTINENTAL SHELF LEASE AREA,**
Geological Survey, Reston, Va. Water Resources Div.; and Department of the Interior, Washington, D. C. Office of Policy Analysis.
R. A. Smith, J. R. Slack, and R. K. Davis.
Open-file report 76-620, 1976. 50 p, 10 fig, 5 tab, 12 ref, append.

Descriptors: *Oil industry, *Atlantic Ocean, *Drilling, *Oil spills, *Environmental effects, Forecasting, Evaluation, Ecology, Path of pollutants, Continental shelf, Northeast U. S.
Identifiers: *Outer Continental Shelf.

The Federal Government has proposed to lease 1,172,795 acres of Outer Continental Shelf (OCS)

lands on Georges Bank off the New England Coast for oil and gas development. Estimated recoverable petroleum resources for the proposed 206 tract sale area range from 180 to 650 million barrels. Contingent upon actual discovery of this quantity of oil, production is expected to span a period of about 20 years. An oilspill risk analysis was conducted to determine relative environmental hazards of developing oil in the North Atlantic Outer Continental Shelf lease area. The study analyzed probability of spill occurrence, likely path of pollutants from spills, and locations in space and time of recreational and biological resources likely to be vulnerable. These results are combined to yield estimates of the overall oilspill risk associated with development of the lease area. (Woodard-USGS)
W77-02972

**A RECONNAISSANCE OF THE EFFECTS OF A FOREST FIRE ON WATER QUALITY IN KINGS CANYON NATIONAL PARK, CALIFORNIA,**
Geological Survey, Menlo Park, Calif. Water Resources Div.
R. J. Hoffman, and R. F. Ferreira.
Open-file report 76-497, August 1976. 17 p, 7 fig, 1 tab, 16 ref.

Descriptors: *Environmental effects, *Forest fires, *Water quality, *Surface waters, Data collections, Sampling, Water analysis, Chemical analysis, Water pollution, Dissolved solids, Nutrients, Trace elements, Carbon, Sediment transport, Algae, National parks, *California.
Identifiers: *Kings Canyon National Park(Calif), Benthic invertebrates.

Following two forest fires in the Roaring River drainage basin, Kings Canyon National Park, Calif., water samples were collected from May to July 1974 to determine water-quality changes resulting from the fires. Field measurements included alkalinity, pH, specific conductance, temperature, and discharge. Samples were analyzed in the laboratory for major dissolved chemical constituents, selected plant nutrients, trace metals, suspended sediment, total organic carbon, and seston. Periphytic algae and benthic invertebrate samples were collected. A noticeable increase in the concentration of nitrogen was found in Roaring River immediately downstream from the Moraine Creek fire. The increase in the concentration of inorganic nitrogen compounds, however, was not great enough to pose a serious threat to the aquatic ecosystem. High total organic nitrogen concentrations may have been due, in part, to factors other than the effect of fire. The results of other water-quality measurements were typical of dilute Sierra Nevada streams and indicate that Roaring River was not adversely affected by the fires. (Woodard-USGS)
W77-02973

**PRELIMINARY RESULTS OF PREIMPOUNDMENT WATER-QUALITY STUDIES IN THE TIOGA RIVER BASIN, PENNSYLVANIA AND NEW YORK,**
Geological Survey, Harrisburg, Pa. Water Resources Div.
J. R. Ward.
Available from the National Technical Information Service, Springfield, VA as ADA-029 315, Price codes: A05 in paper copy, A01 in microfiche. Water-Resources Investigations 76-66, July 1976. 79 p, 23 fig, 6 tab, 13 ref.

Descriptors: *Path of pollutants, *Acid mine water, *Water quality, *Pre-impoundment, *Reservoirs, Pennsylvania, New York, Streams, Data collections, Mine drainage, Strip mines, Chemical analysis.
Identifiers: *Tioga River basin(Pa-NY).

Three impoundments have been proposed for the Tioga study area in Pennsylvania and New York. Two of the reservoirs, Tioga and Hammond Lakes, are presently under construction and will be completed in 1977. Cowanesque Lake is in the planning stages and will be started in the near future. The Tioga River and its major tributaries were sampled monthly from September 1973 to May 1975. Water quality in the Tioga River is degraded by acid-mine drainage entering the stream near Blossburg from both strip- and deep-mined areas. The stream supports few species of aquatic life from Blossburg to its confluence with Crooked Creek. Alkaline water of tributaries Mill Creek, Crooked Creek, and the Cowanesque River counteract the acidity carried downstream from Blossburg, and the water quality of the Tioga River gradually improves, supporting a more diversified population of fish and aquatic life. All of the streams in the Tioga River basin carry nutrients sufficient for algae blooms. Dissolved solids range from very high to moderately high throughout the basin. The Tioga River has high concentrations of sulfate and heavy metals, particularly iron and manganese. Dissolved oxygen was usually above 80 percent saturation and never dropped below 7.0 milligrams per liter throughout the basin. Relationships between selected water-quality parameters have been developed for the sampling stations throughout the basin. Downstream trends were also examined. (Woodard-USGS)
W77-02977

**A WATER-QUALITY ASSESSMENT OF THE BURNHAM CREEK WATERSHED, POLK COUNTY, MINNESOTA,**
Geological Survey, St. Paul, Minn. Water Resources Div.
M. R. Have.
Open-file report 75-647, 1975. 15 p, 2 fig, 4 tab, 12 ref.

Descriptors: *Water quality, *Surface waters, *Chemical analysis, *Water pollution sources, Evaluation, Water properties, Water analysis, Nitrates, Nitrites, Phosphates, Bacteria, Coliforms, Pesticides, Benthic fauna, *Minnesota, Path of pollutants.
Identifiers: Polk County(Minn), *Burnham Creek watershed(Minn).

A water-quality assessment of the Burnham Creek watershed, Polk County, Minn., was made in May 1975. Surface waters were calcium magnesium bicarbonate types with 0.11 mg/liter or less of nitrite plus nitrate nitrogen and 0.10 mg/liter or less of total phosphorous. Fecal coliform bacteria concentrations were between 3 and 720 colonies per 100 milliliters and fecal Streptococci concentrations ranged between 19 and 1600 colonies per 100 milliliters. Pesticide concentrations were low in the stream bottom materials, but an increasing trend was apparent in the downstream direction. The benthic community was dominated by blackfly larvae. (Woodard-USGS)
W77-02979

**CONVECTIVE MODEL OF LONGITUDINAL DISPERSION,**
Geological Survey, Jackson, Miss. Water Resources Div.
R. S. McQuivey, and T. N. Keefer.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY10, Paper 12478, p 1409-1424, October 1976. 1 fig, 1 tab, 17 ref, append.

Descriptors: *Dispersion, *Path of pollutants, *Turbulence, *Streamflow, *Model studies, Analytical techniques, Evaluation.
Identifiers: Linear systems.

Longitudinal dispersion is the spreading out of substances along a stream or channel due to velocity differences and turbulent diffusion. Rather than moving downstream as a slug, the transported quantity is distributed along the length of the stream, some parts traveling faster and some slower than the mean-flow velocity. A model which describes the dispersion process accurately is essential to the understanding and managing of water pollution problems. Longitudinal dispersion can be successfully modeled as a purely convective linear process for approximately one-sixth of the time required to reach the diffusive period. A system-response function developed from the log-law velocity profile may be used up to this limit. The remaining five-sixths of the convective period is modeled as a chain of linear convective systems. Data sets from four flume tests and three natural rivers are used to verify the use of the convective response function. Excellent results are obtained in all cases. (Woodard-USGS)
W77-02988

**DISPERSION--MISSISSIPPI RIVER BELOW BATON ROUGE, LA.,**
Geological Survey, Jackson, Miss. Water Resources Div.
R. S. McQuivey, and T. N. Keefer.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY10, Paper 12490, p 1425-1437, October 1976. 11 fig, 1 tab, 8 ref, append.

Descriptors: *Dispersion, *Path of pollutants, *Mississippi River, *Louisiana, *Model studies, Statistical methods, Numerical analysis, Turbulence, Water pollution, Mixing.

Dispersion is the spreading out of particles along a stream or channel due to velocity differences and turbulent diffusion. A knowledge of the dispersion characteristics of streams and rivers is essential to the understanding and managing of water pollution problems. The data described and analyzed consist of concentration-versus-time and concentration-versus-distance relations measured downstream of an instantaneous point source injection in the Mississippi River at Baton Rouge, La. The objectives of the study are to: (1) Document the initial mixing characteristics of the tracer photographically; (2) determine the longitudinal dispersion coefficient; and (3) verify a simple convective model of the dispersion process. Measurements of longitudinal dispersion and lateral and vertical mixing were made in the Mississippi River at a flow of 795,000 cfs. The results show that the longitudinal dispersion coefficient for the 179-mile reach from Baton Rouge to Point a la Hache, La., was approx 7,500 sq ft/sec. Vertical mixing was accomplished in about 50 miles. A numerical model based on a particular solution of the convection equation was used to aid in data collection. The model provides an accurate simulation of the dispersion process over the entire length of the study reach. (Woodard-USGS)
W77-02989

**SAMPLING AND ANALYSIS OF STORM-WATER RUNOFF FROM URBAN AND SEMI-URBAN/RURAL WATERSHEDS - SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES,**
Purdue Univ., Lafayette, Ind. Dept. of Environmental Engineering.
F. T. R. McElroy, III, C. F. Mattox, D. W. Hartman, and J. M. Bell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 080, Price codes: A06 in paper copy, A01 in microfiche. Purdue University Water Resources Research Center, Technical Report No 64, September 1976. 102 p, 12 fig, 43 tab, 41 ref. (Partial Completion Report). OWRT C-3277(3713)(14).

Descriptors: *Storm runoff, *Urban runoff, *Suspended solids, *Biochemical oxygen demand, Storm water, Coliforms, Antecedent, Precipitation, Sampling, Automation, Methodology, Planning, Cities, Urbanization, Watersheds(Basins), Indiana, Water pollution sources, Waste identification, Rainfall.
Identifiers: *Pollutographs, *Sampling methodologies, Antecedent dry period.

Stormwater runoff samples were collected and analyzed from urban and semi-urban/rural watersheds located in West Lafayette, Ind. Preliminary sampling was performed in order to develop sampling methodology; i.e. to determine the importance of sampling frequency, duration etc., on the resultant stormwater pollutographs. The effects of total rainfall, rainfall intensity, and antecedent dry period on the run-off quality were also determined. The data clearly showed a significant difference in the pollutional concentration of BOD and suspended solids between the urban and semi-urban/rural watersheds. The peak concentration was almost always higher in the urban watershed, being 1-2 times higher in suspended solids and 8-9 times higher in BOD. The mass emission pollutographs were affected by both concentration and flow. However, the flow hydrograph had a much more significant effect on the shape and magnitude of the pollutograph than did concentration. There were indications that the antecedent dry period prior to the storm event had an effect on the magnitude of the mass emission pollutograph. This will receive more study in future research. (Wiersma-Purdue)
W77-02995

**ADAPTATION TO INCREASING SALINITY OF THE COLORADO RIVER,**
California Univ., Davis. Dept. of Land, Air and Water Resources.
For primary bibliographic entry see Field 3C.
W77-02997

**DETECTION OF PATHOGENIC LEPTOSPIRES IN EFFLUENT AND SEWAGE SLUDGE FROM LARGE PIGGERIES, (IN GERMAN),**
Institutul Agronomic din Timisorara (Rumania). Faculty of Veterinary Medicine.
For primary bibliographic entry see Field 5A.
W77-02998

**IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA,**
California Univ., Berkeley. School of Forestry and Conservation.
For primary bibliographic entry see Field 4C.
W77-02999

**HYDRAULIC SIMULATION USING DISTRIBUTED PARAMETERS,**
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W77-03001

**BIOTRANSFORMATION AND CHEMICAL FORM OF MERCURY IN PLANTS,**
Environmental Montoring and Support Lab., Las Vegas, Nev.
For primary bibliographic entry see Field 5C.
W77-03006

**EXTENSIVE OVERBURDEN POTENTIALS FOR SOIL AND WATER QUALITY,**
West Virginia Univ., Morgantown. Div. of Plant Sciences.
R. M. Smith, A. A. Sobek, T. Arkle, Jr., J. C. Sencindiver, and J. R. Freeman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 739, Price codes: A15 in paper copy, A01 in microfiche. Environmental Protection Agency, Environmental Protection Technology Series, Report EPA 600/2-76-184, August, 1976. 310 p, 9 fig, 166 tab, 36 ref.

Descriptors: Pennsylvania, Alabama, Oklahoma, *Mining, *Soil classification, *Strip mines, *Strip mine wastes, Weathering, *Coal mines, *Mine acids, Water quality, *Appalachian Mountain Region, *Toxicity, *Nutrients, Acidic soils, *Water pollution sources, On-site-investigations.
Identifiers: *Potential toxicity, Available nutrients, *Mine soils, Acid base account.

Chemical, physical and mineralogic measurements and interpretations developed during previous studies in West Virginia have been improved and applied to coal overburden columns in 12 widely spaced Neighborhoods and 2 Adjunct locations in 10 states, from Pennsylvania on the Northeast to Alabama on the Southeast and Oklahoma on the West. Field studies in each Neighborhood and Adjunct location involved logging and sampling soil and rock horizons from surface to coal, testing and improving field clues, determining properties of minesoils and water resulting from mining operations, and checking reclamation. Results in different coal basins have broadened our perspectives and strengthened our conclusions. Refinements have been made in field observations, laboratory methods and interpretations related to kinds of mine soils and anticipated uses of mined lands. Consistent overburden property relationships within basis and over particular named coals provide opportunities for generalizations and extrapolation between sampled sites. It appears feasible to use detailed information from overburden sampling and analysis as an aid to pre-mining planning of surface mining operations including reclamation and projected land use. (Katz)
W77-03008

**CADMIUM IN AN AQUATIC ECOSYSTEM: DISTRIBUTION AND EFFECTS,**
New York Univ. Medical Center, N. Y. Inst. of Environmental Medicine.
T. J. Kneip, and H. I. Hirshfield.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 180, Price codes: A06 in paper copy, A01 in microfiche. Report NSF-RA-E-74-044, 1975. 114 p, 4 tab, 4 fig, 10 ref.

Descriptors: *Cadmium, *Nickel, *Water pollution sources, *Water pollution effects, *Industrial wastes, *Hudson River, *Aquatic animals, *Mussels, Water quality, Plankton, Methodology, Toxicity, Fish eggs, Benthos, Methodology, *Ecosystems.
Identifiers: *Macrobenthic population studies, Fish toxicology, Macrobenthic toxicology.

This report is concerned with evaluating the distribution and effects of cadmium and nickel released into an aquatic ecosystem by local industry. The study focused upon the Foundry Cove Area which includes both a tidal marsh and an associated cove on the east side of the Hudson River just north of Constitution Island. The study provides data regarding (1) the processes resulting in the spread of contamination and (2) preliminary systematic information on uptake by biota and possible effects on certain organisms in the ecosystem. (Katz)
W77-03009

**THE BIOLOGY AND CHEMISTRY OF A WARM-WATER STREAM,**
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W77-03010

**THE MICROBIAL DEGRADATION OF OIL IN CONTINUOUS CULTURE,**
State Univ. of New York at Brockport. Dept. of Biology.
P. H. Pritchard, and T. J. Starr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-013 322, Price codes: A05 in paper copy, A01 in microfiche. Annual Report No. 2, June 1975. 81 p, 8 tab, 14 fig, 59 ref. Task No. 133-070. ONR 0014-73-C-0074.

Descriptors: *Oil pollution, *Laboratory tests, *Methodology, *Oily water, *Oil spills, *Oil-water interface, Laboratory analysis, Aquatic microbiology, *Microbial degradation, *Biological treatment, Aquatic environment, Gas chromatography.
Identifiers: *Microbial oil degradation, *Diesel oil, *Continuous culture, Bacterial seeding, *Fate of oil.

This project has dealt with the development and testing of an experimental laboratory model for the microbial degradation of oil in aquatic ecosystems. The type of oil used in these studies was a light diesel oil. The model, which is a continuous culture system, allowed us to observe the fate of a mini oil spill under quiescent conditions in a laboratory situation. The existence of a complex and very sensitive degradation process which is carried out by a diverse population of bacteria was demonstrated. The bacterial attack follows a consistent pattern of slow emulsification, dispersion, and chemical alteration of the oil. It has been verified that the disappearance of oil from the surface of a body of water does not, by any means, coincide with its complete degradation. The complexity of the process, established herein, exemplifies the impractability of using 'seeding' procedures with commercial 'oil-eating' bacterial preparations to deal with oil spills. The oil degradation process in our system was readily altered by the presence of simple organic pollutants and not necessarily enhanced by the addition of detergents. (Katz)
W77-03012

**ANALYSIS OF NONPOINT-SOURCE POLLUTANTS IN THE MISSOURI BASIN REGION,**
Midwest Research Inst., Kansas City, Mo.
A. D. McElroy, F. Y. Chiu, and A. Aleti.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 896, Price codes: A09 in paper copy, A01 in microfiche. Environmental Protection Agency, Socioeconomic Environmental Studies Series, Report EPA 600/5-15-004, March 1975. 163 p, 9 tab, 34 fig. Program Element 1BA030. 68-01-1863.

Descriptors: *Water pollution sources, *Missouri River, *Methodology, *Data collections, Data processing, *Data storage and retrieval, *Water quality, Climactic data, *Land use, Soil classification, *Statistical methods, Biochemical oxygen demand, *Nitrates, Turbidity.
Identifiers: Regression equation, *Water quality profiles, *Statistical analysis of significance, *Missouri River Basin, *Nonpoint source pollutants.

A study was conducted of nonurban, nonpoint sources of pollution in the Missouri Basin utilizing a unique, computer-based data system. The Data Bank contains extensive information on land use, soil, climate, water quality, and other parameters in the Missouri Basin. The current study was concerned with the adequacy of the Data Bank relative to development of nonpoint pollution models. Evaluation of information in the Data Bank yielded detailed land use and water quality profiles in the basin. The results show that the Data Bank is a useful base to depict the basinwide relations between various land uses and water quality. Regression equations of these relationships were developed for individual subbasins as well as for the entire basin. The regression equations, and the accompanying statistical analysis of significance, indicated that the water quality parameters nitrate, BOD, and turbidity correlate well with land use on a basinwide basis. Other parameters, namely phosphorous, dissolved oxygen, and dissolved solids, did not correlate well with land use. (Katz)
W77-03013

**DETERMINATION OF ESTIMATED MEAN MINE WATER QUANTITY AND QUALITY**

FROM IMPERFECT DATA AND HISTORICAL RECORDS.
Environmental Quality Systems, Inc., Rockville, Md.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 721, Price codes: A09 in paper copy, A01 in microfiche. Appalachian Regional Commission, Washington, D.C., Report ARC-72-108 (RPC 728), January 1973. 166 p, 24 tab, 19 fig.

Descriptors: *Water pollution, *Methodology, *Coal mine, *Water pollution sources, *Monitoring, *Statistics, Coal mine wastes, *Acid mine wastes, Mine acids, *Mine wastes, Data collection, Hydrologic data, Mathematical studies, West Virginia, Pennsylvania, Maryland.
Identifiers: Imperfect data, Historical records, *Monogahela River Basin.

This report isone of a series dealing with different aspects of environmental pollution in the Monogahela River Basin. The purpose of the study was to develop a methodology determining the increase or decrease and the sources of pollution when complete data is not available. Special attention was given to acid mine drainage. (Katz)
W77-03014

RESULTS FROM AQUATIC ECOLOGICAL SURVEYS AT NEWPORT ARMY AMMUNITION PLANT, NEWPORT, INDIANA,
Edgewood Arsenal, Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5C.
W77-03015

QUANTITATIVE RELATIONS BETWEEN THE BRYOPHYTES OF THE BELGIAN PART OF THE RIVER SAMBRE AND THEIR FREQUENCY OF EMERSION: VERTICAL DISTRIBUTION AND INFLUENCE OF POLLUTION, (IN FRENCH),
Liege Univ. (Belgium). Dept. of Botany.
Alain Empain.
Bull Soc R Bot Belg 107(2); p 361-374, 1974.

Descriptors: *Mosses, *Submergence, *Rivers, *Water pollution effects, *Environmental effects, Ecological distribution, Ecology, Speciation, Population.
Identifiers: *Belgium, Bryophytes, Bryum argenteum, Cinclidotus danubicus, Clinclidotus fontinaicides, Cinclidotus nigricans, Collema crispum, Dialytrichia mucronata, Didymodon spadiceus, Emersion frequency, Homolathecium sericeum, Hypnum cupressiforme, Lunularia cruciata, Octodiceras fontanum, Orthotrichia anomalum, Orthotrichia cupulatum var. nudum, Platyhypnidium riparioides, Sambre, Schistidium apocarpum, *Vertical distribution.

One species, Octodiceras fontanum, can be considered strictly aquatic. This moss reacts poorly to accidental emersion (exposure to the air). Two species resist continuous immersion, but are linked to frequent emersion: Cinclidotus nigricans and C. danubicus. C. fontinaloides and Lunularia cruciata prefer fairly prolonged emersion, but not in excess. Dialytrichia micronata, Didymodon spadiceus, Orthotrichia cupulatum var. nudum, O. anomalum and the lichen Collema crispum require prolonged emersion. Platyhypnidium riparioides has a broad ecological amplitude regarding frequency of emersion, which permits it to grow in almost continuous immersion or in prolonged emersion. Accidental immersion is unfavorable to the strictly terrestrial species, such as Homolathecium sericeum, Hypnum cupressiforme, etc. Schistidium apocarpum and Bryum argenteum, although terrestrial, are only slightly influenced by temporary immersion. In general the vertical transition between the populations is sharper than expected from the potential ecological amplitude of the various species. In the case of a tolerant species, P. riparioides, the degradation of the environment by pollution enables it to effectively exploit its tolerance of frequent emersion. When ecological conditions become severe the number of species diminishes and the average frequency of species increases.--Copyright 1976, Biological Abstracts, Inc.
W77-03038

BEHAVIOR OF HYDRAZINE COMPOUNDS IN HARD AND SOFT WATER,
Air Force Systems Command, Wright-Patterson AFB, Ohio.
A. R. Slonim.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A019 401, Price codes: A03 in paper copy, A01 in microfiche. Aerospace Medical Research Laboratory, Report AMRL-TR-75-72, September 1975, 26 p, 5 tab, 1 fig, 9 ref.

Descriptors: *Water pollution sources, *Organic compounds, Physical properties, Hardness(Water), Alkalinity, Hydrogen ion concentration, Conductivity, Dissolved oxygen, Laboratory tests, Water quality, Biochemical oxygen demand.
Identifiers: *Hydrazine, 1,1-dimethylhydrazine, Unsymmetrical dimethylhydrazine, *Aerozine-50, Monomethylhydrazine, Hard water, Soft water, Propellant solution.

The behavior of hydrazine, 1,1-dimethylhydrazine (known as unsymmetrical dimethylhydrazine, UDMH), Aerozine-50, and monomethylhydrazine (MMH) in hard and soft water was studied prior to evaluating their effects on aquatic organisms. Hard and soft water propellant solutions were examined over a 96-hour period for changes in physical characteristics, phenolphthalein and total alkalinity, pH, specific conductance, EDTA hardness, and dissolved oxygen (DO). All four compounds at low concentrations (0.1 and 1.0 mg/l) had no effect on these variables, but at 100 mg/l produced changes that were significantly different between hard and soft water, indicating an appreciable amount of coordination of hydrazine compounds with calcium and other hard water ions. The oxygen level was reduced by all four compounds at 100 mg/l usually within the first day; in one detailed study, hydrazine in hard water caused the greatest drop in DO at 5 to 13 hours of exposure. In general, the propellant effects were not of a magnitude to preclude conducting acute toxicity tests in an open static bioassay. (Katz)
W77-03042

RECOVERY OF POLLUTED LAKES; A SWEDISH RESEARCH PROGRAM ON THE EFFECTS OF ADVANCED WASTEWATER TREATMENT AND SEWAGE DIVERSION: 7. DIFFUSE MUNICIPAL POLLUTION: EXAMPLES FROM THE TOWNS OF MOTALA AND UPPSALA, (IN SWEDISH),
Uppsala Kommun Naturvardsverkets RR-Undersokning (Sweden). Algtestlab. Fysiol. Bot.
For primary bibliographic entry see Field 5D.
W77-03057

## 5C. Effects Of Pollution

EXPERIMENTAL NITRITE TOXICITY IN RAINBOW TROUT AND CHINOOK SALMON,
Bureau of Sport Fisheries and Wildlife, Bozeman, Mont. Fish Cultural Development Center.
C. E. Smith, and W. G. Williams.
Trans Am Fish Soc. 103(2), p 389-390, 1974.

Descriptors: *Toxicity, *Nitrites, *Rainbow trout, *Chinook salmon, Water pollution effects, Mortality.
Identifiers: Nitrate-nitrogen.

Two groups of 20 yearling rainbow trout (Salmo gairdneri) were exposed continuously to inflowing water containing 0.15 and 0.55 mg/liter nitrite as nitrite nitrogen (NO2-N), for 48 and 24 h, respectively. Both groups developed methemoglobinemia but mortality occurred only at the highest concentration (55%). Salmon (Oncorhynchus tschowytscha) exposed to 0.50 mg/liter NO2-N for 24 h developed methemoglobinemia and suffered a 40% mortality. Fingerling trout were less sensitive to nitrite than yearlings.--Copyright 1974, Biological Abstracts, Inc.
W77-02581

SEASONAL VARIATIONS IN CONCENTRATIONS OF NITRATE AND TOTAL PHOSPHORUS, AND CALCULATED NUTRIENT LOADING FOR SIX LAKES IN WESTERN NEW YORK,
State Univ. of New York at Buffalo. Dept. of Biology.
K. M. Stewart, and S. J. Markello.
Hydrobiologia. 44(1), p 61-89, 1974.

Descriptors: *Seasonal, *Nitrates, *Phosphorus, Soils, *Nutrients, Lakes, *New York, Water pollution effects.
Identifiers: England(Lakes).

Seasonal variations in concentrations and ranges of nitrate and total phosphorus were measured in 6 lakes (Conesus, Canadice, Honeoye, Devil's Bathtub, Java and Lime) of western New York. The variations may reflect the geochemistry of the area, local differences in lake hydrology and mixing characteristics, and the supply of nutrients from soil, man, and precipitation. Calculations, of nutrient (P) loading were made for the 6 lakes in New York, and compared to loading values for 9 English lakes. The specific values derived from the calculations cannot be considered absolute but they do indicate the relative importance of human vs. edaphic contributions and provide an aid in management consideration.--Copyright 1974, Biological Abstracts, Inc.
W77-02588

EFFECTS OF RECREATION ON WATER QUALITY IN WILDLANDS,
Colorado State Univ., Fort Collins, Colo. Dept. of Recreation Resources.
R. Aukerman, and W. T. Springer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 104, Price codes: A03 in paper copy, A01 in microfiche. Eisenhower Consortium for Western Environmental Forestry Research, Fort Collins, Bulletin, No. 2, 28 p, Febuary, 1976. 1 fig, 36 ref, 7 tab.

Descriptors: *Water pollution, *Camping, *Recreation wastes, Water pollution sources, Wastes, Water pollution effects, Colorado, Bacteria, Roads, Camp sites, Turbidity, Dissolved oxygen, Water quality, Rocky Mountain region.
Identifiers: *Colorado Front Range, Wildlands.

The effect of present concentrations and varying types of campers upon water quality in the Colorado Front Range west of Fort Collins, Colorado, was studied. The eight campgrounds studied are heavily used, located along water, accessible by different types of access routes (paved and unpaved road and footpaths), and cater to different types of campers (motorized campers, camper-trailer, and backpack campers). Results indicate that recreational use is not at present a significant cause of bacterial water pollution, and ancillary monitoring shows that turbidity and dissolved oxygen concentrations are also unaffected by recreation use. In the case of motorized-camper campgrounds, provisions should be made to prevent vehicular approach to water bodies. (Witt-IPC)
W77-02590

**GROUNDWATER POLLUTION BY WOOD WASTE DISPOSAL,**
Oregon State Dept. of Environmental Quality, Salem.
For primary bibliographic entry see Field 5B.
W77-02591

**PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME I: PROJECT REPORT,**
Kansas Water Resources Research Inst., Manhattan.
G. P. Willhite, F. B. Cross, W. J. O'Brien, Y. S. Yu, and J. Wagner.
Completion Report, KWRRI Contribution No 174, July 1976. 160 p, 48 fig, 14 tab, 89 ref. OWRT B-032-KAN(1), 14-31-0001-3889.

Descriptors: *Mathematical models, Water quality, *Instrumentation, *Zooplankton, *Phytoplankton, *Fish population, *Thermal pollution, *Kansas.
Identifiers: *Thermal discharge effects, Power generation, *Temperature distributions, *Lake circulation, Wind stress, Predictive methods, *La Cygne Lake(Kan).

An interdisciplinary study was conducted at La Cygne Lake (1052 ha) in eastern Kansas in order to determine the physical and biological effects of thermal discharges from an 840 MW power plant. Results cover three years of study, including periods before and after plant start-up. Power generation was intermittent during the study. Temperature distribution and circulation patterns were controlled by interactions of wind stress on the surface of the water and the morphometry of the lake. Available predictive models were evaluated. Seasonal variations of temperature prior to power plant operation were predicted satisfactorily. Accurate prediction of temperature distribution caused by thermal discharge into the lake was not possible with available models. Particulate carbon, alkalinity and orthophosphate declined due to successional events, whereas hardness and sulfates increased with plant operation. Reduced abundance of Chlorophyll a near the discharge weir correlated with power production in the summer but not in winter. One species of zooplankton gained a competitive advantage in the lake after thermal discharge began. The relative abundance and age distribution of the fish population changed as a successional event. Fish were continuously attracted to the discharge region by plant induced circulation and increased temperature. No detrimental biological effects were observed. Application of La Cygne results to other reservoirs is discussed. (See also W77-02617)
W77-02616

**PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME II: PROCEDURES AND SELECTED FIELD DATA,**
Kansas Water Resources Research Inst., Manhattan.
G. P. Willite, F. B. Cross, W. J. O'Brien, Y. S. Yu, and J. Wagner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 887, Price codes: A09 in paper copy, A01 in microfiche. Completion Report, KWWRI Contribution 174, July 1976, 160 p. OWRT B-032-KAN(1).

Descriptors: *Data collections, Kansas, Thermal pollution, Climatic data, Hydrologic data, Water quality, Waves(Water), Water temperature, Plankton, Fish, Computer programs.
Identifiers: La Cygne Lake(Kan), Drogue track studies.

Selected tabular and graphical information are presented on: Climatological and Hydrological Data; Water Quality; Wave and Drogue Track Studies; Temperature Surveys; Plankton Data; Fish; and Computer Programs for One-Dimensional Heat Transfer Models. (See also W77-02616)
W77-02617

**ECOLOGICAL MODELING AND ESTIMATION OF STRESS,**
Rensselaer Polytechnic Inst., Troy, N.Y. Fresh Water Inst.
R. A. Park.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 952, Price codes: A02 in paper copy, A01 in microfiche. Report FWI 75-14 (EDFB-IBP 245), October 1975. 20 p. 14 fig. OWRT C-2209(No. 3307) N.Y.(3), EPA 68-03-2142, NSF BMS 69-01147A09 and BMS 75-14168, OWRR 14-31-0001-3387.

Descriptors: *Computer models, *Environmental effects, *Ecosystems, *New York, Diatoms, Population, Bioindicators, Trophic level, Eutrophication, Land use, Lakes.
Identifiers: *Lake George(NY), Multivariate analysis, Aquatic models, Terrestrial models, CLEANER computer model, LAND computer model.

Ecological modeling procedures are being used to study environmental impacts on Lake George, New York. A multivariate analytical approach, including cluster analysis and ordination, helps facilitate the interpretation and delineation of biotic responses to stresses, such as nutrient enrichment as shown by diatom death assemblages. General trends in nutrient enrichment were determined and a gradational series of patterns developed, resulting in a map of the nutrient stress on each part of the lake. Nutrient-enriched areas were adjacent to population centers and nutrient-poor areas in undeveloped parts. Aquatic and terestrial simulation models provide insights into complex relationships and, through perturbation analysis, permit evaluation of the consequences of environmental impact. CLEANER, an aquatic ecosystem model, represents functional ecologic and physiologic relationships. Stresses like changes in temperature, nutrients, and turbidity can be studied. Perturbations in the driving variables result in simulations that estimate the complex effects of environmental stress on all major ecosystem components. LAND, a terrestrial ecosystem and land-use model, is being developed to simulate land-use changes and vegetational succession. It subdivides the area and considers site-specific soil, slope, vegetational, aesthetic, and cultural characteristics of each. Coupled with CLEANER it will provide basin-wide analyses. (Buchanan-Davidson--Wisconsin)
W77-02622

**THE ENVIRONMENTAL FATE OF SELECTED POLY-NUCLEAR AROMATIC HYDROCARBONS,**
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W77-02625

**POLLUTION ASPECTS OF CATFISH PRODUCTION - REVIEW AND PROJECTIONS,**
Georgia Univ., Athens. Dept. of Agricultural Engineering.
J. C. Barker, J. L. Chesness, and R. E. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 943, Price codes: A07 in paper copy, A01 in microfiche. Report EPA-660/2-74-064, July, 1974, 121 p., 35 tab., 24 fig., 66 ref.

Descriptors: *Aquiculture, *Water pollution effects, Freshwater fish, *Reviews, *Waste disposal, Water quality, Oxygen, Biochemical oxygen demand, Nitrogen, Ammonia compounds, Waste treatment, Phosphorous compounds, Phosphates, *Catfishes, Wastes, Suspended solids, Bibliographies.
Identifiers: *Catfish culture, *Catfish wastes, Biological degradation, BOD reductions.

A literature review and field study was undertaken to determine the waste concentrations and discharge loadings occurring in the waters from catfish-culturing ponds and raceways. Water quality analyses were performed on samples taken during a 240-day growing season and at drawdown (assuming drainage at harvest). The natural biological degradation of the raw wastes in the ponds and raceway systems resulted in BOD reductions of 96.8% and 98.0%, respectively, when compared to waste levels produced in indoor single pass tank systems with no waste removal facilities. Reductions in total nitrogen of 97.2% and 97.7% occurred in ponds and raceways, respectively. Sedimentation and biodegradation resulted in an 83.6% reduction in suspended solids in ponds and an 86.2% suspended solids reduction in raceways. Total phosphate levels were reduced by 98.5% in ponds and raceways, respectively. (Katz)
W77-02626

**EFFECTS OF CRUDE OIL ON MARINE INVERTEBRATES,**
Texas Univ. Medical Branch at Galveston. Marine Biomedical Inst.
J. S. Kittredge.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A017 921, Price codes: A02 in paper copy, A01 in microfiche. Final Report to Office of Naval Research, 26 August 1975, 5 p., 2 ref.

Descriptors: *Crustacea, Crabs, Oil, *Oil pollution, *Physiology, *Behavior, *Food habits, Ecology, Environment, Benthos, Methodology, Shrimp, Oil spill, Environmental effects, Laboratory tests, Sea water, Water pollution effects, *Invertebrates, Organic compounds.
Identifiers: Pacific Lined Shore Crab, Menippe mercenaria, Feeding response, Naphthalene, Alkylnaphthalnes, Aliphatic hydrocarbons, Polyaromatic hydrocarbons.

A brief summary of research on the effects of crude oil on the behavior of marine invertebrates, principally crustaceans. Behavior patterns examined was the feeding response. Polyaromatic hydrocarbons were probably the potentially dangerous component of oil pollution. (Katz)
W77-02627

**TRACE HYDROCARBON ANALYSIS: THE NATIONAL BUREAU OF STANDARDS, PRINCE WILLIAM SOUND/NORTHEASTERN GULF OF ALASKA, BASELINE STUDY,**
National Bureau of Standards, Washington, D. C. Analytical Chemistry Div.
For primary bibliographic entry see Field 5A.
W77-02628

**LITERATURE STUDY OF SELECTED POTENTIAL ENVIRONMENTAL CONTAMINANTS, ANTIMONY AND ITS COMPOUNDS,**
Little (Arthur D.), Inc., Cambridge, Mass.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 438, Price codes: A08 in paper copy, A01 in microfiche. Report EPA-560/2-76-002, February 1976. 147 p., 15 tab., 139 ref.

Descriptors: *Metals, *Public health, *Environment, Environmental sanitation, Environmental effects, *Chemical industry, *Toxicity, *Occupation, Air pollution, *Bibliographies, Water pollution.
Identifiers: *Antimony, *Antimony compounds, Occupational diseases, Antimony industries, Antimony dusts, Pneumoconiosis, Antimony toxicity, Industrial antimony, Antimony trioxide, Tartar emetic.

A comprehensive review of the literature published since 1 January 1954 was conducted to prepare this preliminary investigation report on the physical and chemical properties of antimony

(Sb) and its compounds, on the environmental factors related to their consumption and use, on the health and environmental effects resulting from exposure to Sb and antimonials, and on the regulations and standards governing their use. Antimony and its compounds, although not ranked among the biggest volume chemicals in the U. S., are industrially significant because of their contribution to the manufacture of many commonly-used products, such as alloys, paint, paper, plastics and textiles. Antimony trioxide (antimony oxide) is used to impart flame resistance to plastics, textiles, and other products. Antimony dusts have been associated with the development of pneumoconiosis in miners and other workmen. Some antimony compounds are toxic, or give rise to toxic decomposition products, but no serious occupational poisoning has been associated with the industrial use of antimony. (Katz)
W77-02629

**RESIDUAL TOXICITY OF OZONIZED SEAWATER TO OYSTER LARVAE,**
Oregon State Univ., Corvallis. School of Oceanography.
J. M. DeManche, P. L. Donaghay, W. P. Breeze, and L. F. Small.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 821, Price codes: A02 in paper copy, A01 in microfiche. Sea Grant College Program, Publication No. ORESU-T-75-003, November, 1975. 7 p., 1 tab., 1 fig., 2 ref.

Descriptors: *Ozone, *Oysters, *Toxicity, *Bioassay, Sea water, *Activated carbon, Water quality, *Mollusca, Larvae, Oxygen, Aquatic animals, Laboratory methods, Aquiculture, Water pollution effects.
Identifiers: *Residual toxicity, *Ozonized sea water, *Oxidizing agents, Water sterilization, Sea water culture systems, *Activated charcoal, Aquaculture systems, Ozone toxicity.

Ozone, a potent oxidizing agent, has found wide application in sterilization and control of water quality in fresh-water systems. However, its application to seawater culture systems has been limited by its residual toxicity. This paper describes a method which employs activated charcoal to remove this residual toxicity. The ozone-charcoal treatment sequence should prove beneficial in maintaining water quality for rearing even very sensitive organisms such as oyster larvae. (Katz)
W77-02630

**THE MARINE BIOLOGICAL IMPACT OF THE HONOLULU GENERATING STATION,**
Hawaii Univ., Honolulu. Sea Grant Program.
J. C. McCain, S. L. Coles, and J. M. Peck, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 369, Price codes: A04 in paper copy, A01 in microfiche. Sea Grant Technical Report UNIHI-SEAGRANT - TR-76-01, September, 1975. 50 p, 15 tab, 5 fig, 39 ref.

Descriptors: *Thermal pollution, Thermal stress, *Thermal water, *Water pollution effects, *Water temperature, Aquatic environment, Biological effects, *Environmental effects, Zooplankton, Marine fish, *Reefs, Hawaii, *Coral, Marine environment, Growth, On-the-site investigations, Daily hydrograph.
Identifiers: *Honolulu Harbor, Oahu, *Macrozooplankton, Reef canals, *Outfall jet plume, *Coral growth, *Fish standing crop, Intake basins, Discharge basins.

Studies of the effects of the Hawaiian Electric Generating Station on the zooplankton, reef corals, and fishes of Honolulu Harbor, Oahu, Hawaii were made during 1972-73. No distinct detrimental effects attributable to the generating station were revealed by these studies. The macrozooplankton community in the outfall basin more closely resembled communities sampled outside the harbor than elsewhere in the harbor, which receives a variety of pollutants. Differences in distribution and abundance of macrozooplankton were more closely related to depth and temporal differences than to power station discharge. Although reef corals were restricted from the wall directly in the path of outfall jet plume, the total coverage of live corals in the discharge basin exceeded that of the intake basin and discharge basin coral colonies were generally larger. Negligible coral growth was found anywhere else in the harbor. Fish standing crop in the discharge basin was estimated to be approximately twice that of the intake basin and little movement was noted between the two areas. Standing crop in both basins was generally higher than estimates for tropical and subtropical shallow water areas. No clear comparisons were possible concerning weight per unit length of fishes in the intake versus discharge basins. (Katz)
W77-02631

**ANALYSIS AND CONTROL OF THERMAL POLLUTION (178) TRAINING MANUAL,**
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Programs Operations.
For primary bibliographic entry see Field 5B.
W77-02632

**CADMIUM IN THE ENVIRONMENT - III: A TOXICOLOGICAL AND EPIDEMIOLOGICAL APPRAISAL,**
Karolinska Institutet, Stockholm (Sweden).
For primary bibliographic entry see Field 5B.
W77-02633

**THE MANUFACTURE AND USE OF SELECTED ALKYLTIN COMPOUNDS, TASK II,**
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W77-02634

**MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. CHROMIUM.**
National Research Council, Washington, D.C. Committee on Biologic Effects of Atmospheric Pollutants.
National Academy of Science: Washington, D.C., 1974. 155 p, $6.50.

Descriptors: *Chromium, *Reviews, Bibliographies, Water pollution effects, *Pollutant identification, Metabolism, Air pollution, Nutrient requirements, Environmental effects.
Identifiers: *Literature reviews.

Results of literature research on the biologic and health effects of Cr are summarized in this monograph. The literature evaluated covers available publications dating to July, 1972. The opening chapters discuss the properties of Cr, its distribution in the environment and its industrial uses. The subsequent chapters examine the biologic interactions of Cr, its necessity in nutrition, and its absorption, metabolism and excretion. The effects of Cr are studied in humans, aquatic species and vegetation. Results of experimental exposures of animals to Cr compounds are described and standards for Cr content of air and water in various countries are discussed. Conclusive results on the biologic effect of Cr are not provided since they were not available in the literature studied, but areas for future research are recommended. The appendix contains details for the analysis of Cr. An index and a reference list are included. This book will be valuable as a summation of information Cr.--Copyright 1974, Biological Abstracts, Inc.
W77-02635

**A STATEMENT OF CONCERNS AND SUGGESTED ECOLOGICAL RESEARCH, REPORT NUMBER 1 OF THE LAKE MICHIGAN COOLING WATER STUDIES PANEL.**
Lake Michigan Cooling Water Studies Panel, Chicago, Ill.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 131, Price codes: A17 in paper copy, A01 in microfiche. Report EPA-905/3-75-001, Nov. 1975. 382 p., 1 append.

Descriptors: *Freshwater fish, Aquatic life, *Lake Michigan, *Thermal power, *Thermal water, *Thermal power plants, Commercial fish, Biota, Benthos, Plankton, Aquatic algae, Crustaceans, Zooplankton, Phytoplankton, *Electric power, *Water temperature, Radioecology, *Thermal pollution.

A statement is presented of concerns and suggested research by the Lake Michigan Cooling Water Studies Panel. The intent of the statement is to assist the development of investigations of the effects of cooling water use on Lake Michigan. The introductory considerations of Lake Michigan are presented in the first section. The second section presents recommendations toward objective quantification of the effects of cooling water use through proper statistical planning, study design, and data collection. The remaining seven sections relate information the authors consider basic to an understanding of the effects of cooling use on physial and chemical aspect, primary producer and consumer communities, macrozoobenthos, fishery, entrapped and entrained organisms, and radioecology of Lake Michigan. All sections of the report attempt to produce improvement in research design and a trend toward standardization of results. In addition, questions are posed and ranked resulting in numerical priorities with the intent to guide research in those areas of knowledge which are barriers to an adequate understanding of the effects of cooling water use. (Katz)
W77-02636

**MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. VANADIUM.**
National Research Council, Washington, D. C. Committee on Biologic Effects of Atmospheric Pollutants.
National Academy of Science: Washington, D.C., 1974. 113 p. $5.25.

Descriptors: Water pollution effects, Environmental effects, *Reviews, Bibliographies, Water pollution sources, Pollutant identification, Air pollution, Metabolism, Soils.
Identifiers: *Vanadium.

This report by the Panel on Vanadium summarizes the available data on the biologic effect of environmental compounds. The text begins with a discussion on industrial processes and uses involving V and its compounds. Contamination resulting from handling of V residues is examined. The source of V in the ambient air and in the environment are dealt with and emission of V into the air due to combustion of coal and oil, and V concentration in the atmosphere, earth's crust, water, plants, animals and food was covered. The chapter on the biologic effects of V examined the effects on man, experimental animals and on metabolism. Recommendations for future research areas on or related to the biologic effects of V are included. The appendix contains discussions on desulfurization of residual fuel oils and the detection and measurement of V in biologic and pollution materials. Over 200 references are listed and an index is included.--Copyright 1974, Biological Abstracts, Inc.
W77-02637

**ASPECTS OF CARBON METABOLISM IN FILAMENTOUS MARINE FUNGI,**
Florida Atlantic Univ., Boca Raton. Dept. of Biological Sciences.

P. L. Sguros.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-022 474, Price codes: A02 in paper copy, A01 in microfiche. Final Report to Office of Naval Research, (Washington D. C.), Microbiology Branch, Contract No. N00014-67-A-0320-0002, April 1976. 16 p., 18 ref.

Descriptors: *Degradation, *Marine microbiology, Aquatic fungi, *Marine fungi, *Biodegradation, *Microbial degradation, *Plant physiology, *Biochemistry, Laboratory techniques, Phytoplankton, Mode of Action, Nitrogen, Carbohydrates.
Identifiers: *Carbon metabolism, *Filamentous marine fungi.

A nutritional screening of 117 carbon and/or nitrogen sources against marine fungal cultures revealed poor acceptance of any compound as both C and N source, broad flexibility in accepting nitrogen sources, and a very narrow restriction of C sources to a few cellulose-associated carbohydrates. Oxidative dissimilation of glucose resulted in almost total conversion to cell substance and carbon dioxide. Cell substance averaged 45% C, 5.4% N, and 5.9% H. Economic coefficients averaged 76% decreasing as substrate glucose concentrations increased. Enzymatic studies revealed that glucose can be metabolized by the Embden-Meyerhof-Parnas, pentose glyoxylate bypass. The cellulase complex was found to consist of three inducible agents: hydrocellulase, glucanase and cellobiases, the first two being primarily exocellular and the latter intracellular. Glucanase and cellobiase were favored by pH 5-6 at 37 C, while the former was stable over pH 3-9 and the latter from 5-9 at 37 C. Both enzymes were deactivated in 15 min at 100 C. Cellobiose was a strong inducer of cellulase and Tween 80 stimulated cellulolytic activity greatly. (Katz)
W77-02638

**ENVIRONMENTAL POLLUTION IN THE NEW LEAD BELT, (RANN UTILIZATION EXPERIENCE, CASE STUDY NO. 2),**
Missouri Univ., Rolla.
For primary bibliographic entry see Field 5B.
W77-02639

**COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. V, MONITORING PROGRAM CAPABILITY, DESCRIPTOR TABLES,**
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02641

**COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES. VOLUME II, DIRECTORY OF STATE TOXIC SUBSTANCES MONITORING AGENCIES,**
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02642

**INVESTIGATION OF SELECTED POTENTIAL ENVIRONMENTAL CONTAMINANTS: HALOETHERS,**
Syracuse Univ. Research Corp., N. Y., Life Sciences Div.
P. R. Durkin, P. H. Howard, and J. Saxena.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 356, Price codes: A09 in paper copy, A01 in microfiche. Report EPA-560/2-75-006, September, 1975, 168 p, 43 tab, 23 fig, 171 ref.

Descriptors: Public health, *Toxicity, *Environmental sanitation, Human pathology, Potable water, Water pollution, Water quality, Chemical industry, *Chemical wastes, Chlorides, Fluorides, Environmental effects, *Reviews, *Bibliographies, Solvents, Mammals.
Identifiers: *Haloethers, bis(chloromethyl)ether, Chlorex, bis(2-chloroethyl)ether, bis(2-isopropyl)ether, a-chloroethers, B-chloroethers, ion exchange ethers.

A review is presented of the potential environmental hazard from the commercial use of haloether compounds. The fluorinated anesthetic ether, methoxyfurane (2,2-dichloro-1,1-difluoroethyl methyl ether) and fluroxene (2,2,2-trifluoroethyl vinyl ether), and only peripherally treated. Major focus is on the a-chloroethers, bis(chloromethyl)-ether and chloromethyl methyl ether, and the B-chloroethers, bis(2-chloroisopropyl)-ether, bis (2-chloroethyl) ether, and bis (2-chloroethoxy) methane. The a-chloroethers are used as chemical intermediates for production of ion exchange resins while the B-chloroethers are used mostly for solvents but have some chemical intermediate uses. Information on physical and chemical properties, production methods and quantities, commercial uses and factors affecting environmental contamination, as well as information related to health and biological effects, are reviewed. (Katz)
W77-02643

**MOLYBDENUM: A TOXCOLOGICAL APPRAISAL,**
Karolinska Institute, Stockholm (Sweden). Dept. of Environmental Hygiene.
L. Friberg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 458, Price codes: A07 in paper copy, A01 in microfiche. Report EPA 600/1-75-004, November, 1975, 141 p, 74 tab, 4 fig, 199 ref.

Descriptors: *Metals, *Molybdenum, *Toxicity, *Metabolism, *Path of pollutants, Environmental effects, *Bibliographies, *Reviews, Agricultural chemicals, Agriculture, *Public health, Pathology, Physiology, Environmental sanitation, Water pollution, Aquatic organisms, Animal physiology, Copper.
Identifiers: Molybdenum poisoning, Animal experiments, Animal nutrition, Molybdenum essentiality, Teart disease.

This review presents and evaluates the available material on the metabolism and toxicology of molybdenum with emphasis on those aspects of relevance to human beings. Agricultural and environmental aspects of molybdenum are less completely covered. Special efforts have been made to include recent publications in Russian, and to coordinate this work with a similar effort under way in the Environmental Health Criteria Programme of the World Health Organization. (Katz)
W77-02647

**PROCEEDINGS OF: NATIONAL CONFERENCE ON HEALTH, ENVIRONMENTAL EFFECTS, AND CONTROL TECHNOLOGY OF ENERGY USE.**
Environmental Protection Agency, Washington, D. C. Office of Energy, Minerals and Industry.
For primary bibliographic entry see Field 5G.
W77-02649

**THE EFFECTS OF FRESHWATER WITHDRAWALS ON FISH AND WILDLIFE RESOURCES,**
Fish and Wildlife Service, Washington, D. C. Western Water Allocation.
For primary bibliographic entry see Field 5G.
W77-02655

**FRESHWATER ECOLOGICAL EFFECTS,**
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 5G.
W77-02657

**THE EPA RESEARCH PROGRAM ON THE FRESHWATER ECOLOGICAL EFFECTS OF ENERGY DEVELOPMENT AND USE,**
Environmental Protection Agency, Washington, D.C. Office of Health and Ecological Effects.
For primary bibliographic entry see Field 5G.
W77-02658

**PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE.**
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
Held at Bal Harbour, Florida, October 1975. Published in May 1976, 123 p.

Descriptors: *Continental Shelf, *Resources development, *Water pollution effects, *Legal aspects, *Fishing gear, *Fish management, Conferences, Economics.
Identifiers: *Outer Contiental Shelf, Jurisdiction, Echo sounding.

Four groups of papers constitute the proceedings of twenty-eighth annual Gulf and Caribbean Fisheries Institute. The Fisheries Jurisdiction Session consisted of papers on: The New Ocean Regime; The Status of Extended Jurisdiction over Our Fishery Resources; Interstate Marine Compact Commissions--Role in Fisheries Management; Suggested State Legislation for Effective Management of Marine Fisheries; Florida's Position Regarding HR 200 (Extended Jurisdiction); and The Western Central Atlantic Fishery Commission (WECAFC): Its Implications and Impact. The Continental Shelf Session papers were: Multiple-use Conflicts between Fishermen and other Users of the Ocean with a Consideration of a Possible Expanded Federal Role; Identification and Mapping of Fishing Banks on the Outer Continental Shelf of the Gulf of Mexico; Current Studies toward the Protection of the Environment in the MAFLA Area; and Contaminant Effects on Biota of the New York Bight. Papers of the Fisheries Biology Session are: Gear and Economic Efficiency Results of a Sea Grant Twin-Trawl; Abundance and Potential for Fisheries; Aquarium Fish Hobby; Progress toward Management of the Atlantic Bluefin Tuna; Outline for a Southeastern Regional Recreational Fishery Program Development Plan and Status Report of Florida's Research on the Spiny Lobster Biology. The final session was a Fisheries Workshop. (NOAA)
W77-02660

**MARINE POLYCULTURE BASED ON NATURAL FOOD CHAINS AND RECYCLED WASTES,**
Woods Hole Oceanographic Institution, Mass.
J. H. Ryther.
Woods Hole Oceanographic Institution Technical Report No. WHOI-76-92, October 1976, 281 p. SG-04-6-158-44016.

Descriptors: *Aquiculture, *Marine algae, *Recycling, Waste water treatment, *Food chains, Effluents, Mollusks, Nutrients, Crustaceans, Solid wastes, Shellfish, Sewage treatment.
Identifiers: Recycled wastes, Finfish, Sea weeds.

Research has continued during the past fiscal year on the development, testing, and evaluation of a combined waste recycling-marine polyculture system. The concept of the system is to grow unicellular marine algae (Phytoplankton) in mixtures of seawater and the effluent from a secondary sewage treatment plant. The algae grown in continuous flow-through cultures, are then fed to bivalve molluses, such as oysters, clams, scallops, or mussels. The algae remove the nutrients from the wastewater and the molluscs remove the algae. Finfish (winter flounder) and crustacea (American Lobster) are stocked as post-larval or juvenile animals together with the molluscs to feed upon the solid wastes (feces and pseudo feces) produced by the shellfish and upon the small in-

vertebrate fauna (polychaete worms, amphipods, etc.) that are supported by these wastes. Seaweeds constitute a final polishing stage to the system, receiving the effluent from the animal culture system and removing from it nutrients regenerated through excretion and metabolism of the animals as well as any nutrients from the wastewater not initially removed by the phytoplankton. Twelve reports by various authors are compiled in this volume. (NOAA)
W77-02662

**THE ARCTIC COASTAL ENVIRONMENT OF ALASKA. VOL. II: A COMPILATION AND REVIEW OF SCIENTIFIC LITERATURE OF THE ARCTIC MARINE ENVIRONMENT,**
Alaska Univ., College. Inst. of Marine Science.
H. M. Feder, D. G. Shaw, and A. S. Naidu.
Sea Grant Program Report No. 76-9, IMS Report No. R76-5, May 1976. 207 p. SG-04-5-158-35.

Descriptors: *Arctic Ocean, *Alaska, *Bibliographies, *Oil pollution, *Oil spills, *Baseline studies, *Environmental effects, Cold regions, Plankton, Algae, Benthos, Fishes, Coasts, Ecology.
Identifiers: *Outer Continental Shelf, *Marine environments, *Environmental impact, Literature reviews, Physical oceanography, Chemical oceanography, Geological oceanography, Marine birds, Marine mammals.

This publication is volume two of a report on the arctic coastal environment of Alaska. It is a compilation and review of scientific literature of the arctic marine environment. This reference, for convenience of the user, is divided into eleven chapters as follows: Physical Oceanography; Chemical and Geological Oceanography; Plankton; Benthic Algae; General Ecological and Biological Studies; Ice Algae, Benthic Microalgae and Primary Production; Benthic Invertebrates; Fishes; Marine Birds and Mammals; Environmental Impact; and Oil Pollution: Environmental Effects of an Oil Spill at Prudhoe Bay. Each chapter consists of a short narrative reviewing key literature. All chapters except chapter two contain a reference section which includes citations, and supplemental references. (NOAA)
W77-02665

**THE TOXICITY OF SELECTED CHEMICALS USED IN POWER GENERATING STATIONS TO HAWAIIAN FISHES,**
Hawaii Univ., Honolulu.
J. C. McCain, and J. M. Peck, Jr.
Sea Grant Technical Report No. UNIHI-SEAGRANT-TR-77-1, September 1976. 21 p, 1 fig, 6 tab, append. SG-04-6-158-44114.

Descriptors: *Toxicity, *Hawaii, *Powerplants, *Environmental effects, *Water pollution effects, Aquatic animals, Fishes, Waste disposal, Chemical wastes.
Identifiers: Ocean dumping, Amines, Morpholine, Power generating stations.

The acute toxicity of two waterborne chemicals to fishes was investigated. The two compounds, filming amine and morpholine, are used as corrosive inhibitors in the stream and condensate lines of some power generating stations on Oahu. The acute-static 96-hr $LC_{50}$ or TLm for these compounds was determined for four common Hawaiian marine fishes--the mosquito fish, Gambusia affinis; the white mullet, Chelon engeli; the Jamselfish, Dascyllus albisella; and a species of Talapia. The 96-hr TLm for morpholine was found to be between 100 and 180 ppm for Chelon engeli and between 320 and 560 ppm for Gambusia affinis. The 96-hr LC50 value for filming amine was found to be 0.41 ppm for adult Gambusia affinis and the 96-hr TLm to be 0.25 ppm for juveniles. The range finding results for Chelon engeli, Dascyllus albisella, and Tilapia sp. indicated similar toxicity values for the filming amine. The discharges of these compounds do not exceed the maximum permissible values as determined by the LC50 or TLm values after applying a 0.01 factor. The discharge of these compounds at less than 0.0025 ppm for filming amine and 1.00 ppm for morpholine does not constitute a waste as currently defined by state and federal laws and regulations. (NOAA)
W77-02666

**AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX.**
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 2L.
W77-02671

**ABSTRACTS. SPECIAL SYNPOSIUM - THE MIDDLE ATLANTIC CONTINENTAL SHELF AND NEW YORK BIGHT,**
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
M. G. Gross.
Held at American Museum of Natural History, New York City, NY on November 3-5, 1975. 79 p.

Descriptors: *Abstracts, *Continental Shelf, Marine biology, Marine fisheries, Marine geology, Oceanography, Ocean circulation, Meteorology, Environmental effects, Water pollution sources, Water pollution effects, Ecology, Pollutants, Ecosystems, Waste disposal, Conference.
Identifiers: *Outer Continental Shelf, *New York Bight, Middle Atlantic Continental Shelf, Coastal zone, Marine Ecosystems Analysis Program(MESA).

This is a collection of abstracts of 42 papers presented at a special symposium on the Middle Atlantic Continental Shelf and New York Bight. Subjects encompass all aspects of the marine sciences and fisheries, contamination or pollution and its effects on the environmental and aquatic communities. Interactions between the ocean and atmosphere are dealt with along with various pertinent aspects of marine meteorology. (NOAA)
W77-02678

**THE METULA OIL SPILL,**
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program Office.
C. G. Gunnerson, and G. Peter.
Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. NOAA Special Report, September 176. 42 p, 18 fig, 4 tab, 9 ref, 2 append. Also in Spanish.

Descriptors: Aquatic life, *Oil spills, *Oil pollution, *Water pollution effects, *Tidal marshes, Environmental effects, *Baseline studies, *Intertidal areas, *Coastal marshes, *Estuarine environment, Beaches, Continental shelf, Cold regions, South America.
Identifiers: Outer Continental Shelf, *Strait of Magellan, Tierra del Fuego, Environmental impact, Supertankers, Crude oil.

In August 1974 the supertanker METULA ran aground in the Strait of Magellan and spilled over 50,000 tons of light Arabian crude oil. The spill was not contained and the oil was carried over large segments of beaches and tidal marshes of Tierra del Guego, and deep into the estuaries of the area. Findings of a team of scientists from the United States and Chile, who investigated the environmental damage in August 1974 and again in January 1975, and of others who discussed the spill at a workshop, are summarized. Included are the background of the accident, the physical environment, the reasons why cleanup measures were not attempted, and the most important follow-up research needs. The research results will be used to identify critical environmental information that can be transferred for use in planning and for predicting environmental impacts in other similar areas of the world. (NOAA)
W77-02679

**THE EFFECTS OF TEMPERATURE ON DISEASES AND THEIR HISTOPATHOLOGICAL MANIFESTATIONS IN FISH,**
R. J. Roberts.
In: The Pathology of Fishes, W. E. Ribelin, ed., The University of Wisconsin Press, Madison, Wisconsin, p. 477-496, 1975. 7 fig., 37 ref.

Descriptors: *Fish diseases, *Pathology, *Pathogenic fungi, *Temperature, *Bacteria, *Viruses, *Epidemiology, *Pathogenic bacteria, *Infection, *Zoonoses, Aquiculture, Fish farming, Salmonids, Channel Catfish, Diseases, Microbiology, Heated water, Streptococcus, Aquatic microorganisms, Parasitism.

Bacterial, viral and parasitic diseases and the effect of temperature on the course of these diseases in teleosts is discussed. The pathogenicity of these infectious agents is closely tied to temperature, both in the viability of the organism at a given temperature and in the vulnerability of the fish. Defense mechanisms of the fish are examined in terms of their effectiveness at various temperatures. Skin lesions, a major route of infection, heal slowly at 4C with little cellular inflammatory response, while at 14C there was rapid epithelialization. The fixed macrophage system, circulating antibodies, antiferons and circulating leukocyte systems in fish are discussed. (Katz)
W77-02692

**LESIONS ASSOCIATED WITH CHRONIC EXPOSURE TO AMMONIA,**
C. E. Smith, and R. G. Piper.
In: The Pathology of Fishes, W. E. Ribelin, ed., The University of Wisconsin Press, Madison, Wisconsin, 1975, p 497-514. 1 tab., 6 fig., 29 ref.

Descriptors: *Aquiculture, *Rainbow trout, *Trout, Water quality, *Fish diseases, *Fish farming, *Fish toxins, *Fish physiology, *Dissolved oxygen, *Ammonia, Mortality, Sport fish, Nitrogen compounds, Water pollution sources, Water pollution effects, Microscopy, Growth rates.
Identifiers: *Histology, *Gills.

Rainbow trout were exposed to ammonia concentrations of approximately 0.5, 1.0 and 1.5 ppm as total ammonia for 12 months. When compared to controls, growth of trout was not affected after four months' exposure to 1.0 and 1.5 ppm ammonia. There was a significant reduction in growth after 6 and 12 months for fish reared in 1.6 ppm. Mortality was the same in test and control groups. Pathological changes were observed in gills and livers exposed to 1.6 ppm ammonia for 6 months. As long as oxygen concentrations are kept at 5.0 ppm, it is unnecessary and impractical to maintain ammonia concentrations at 0.1 ppm when rearing rainbow trout. (Katz)
W77-02693

**THE PATHOLOGY OF PESTICIDE POISONING,**
A. H. Walsh, and W. E. Ribelin.
In: The Pathology of Fishes, W. E. Ribelin, ed., University of Wisconsin Press, Madison, Wisconsin, 1975. p. 515-541. 10 tab., 39 ref.

Descriptors: *Pesticides, *Pathology, *Salmonids, *Lake Trout, *Bioassay, *Fishkill, *Toxins, Water pollution effects, Analytical techniques, *Pollutant identification, Reviews, *2,4-D, *DDT, Chlorinated hydrocarbon pesticides, Laboratory tests, Microscopy.
Identifiers: *Histology, *Carbaryl, *Atrazine, *Coho salmon.

Laboratory tests were conducted in which coho salmon (Oncorhynchus kisutch) and lake trout (Salvelinus namaycush) were exposed to several pesticides and then examined for gross and microscopic tissue changes. Comparison between results of this experimentation and observations from the literature are made. Hyperplasia of gill lamellar epithelium, a suggested result of pesticide exposure, was more common in control fish than in test fish in these tests. 'Shrunken' spleens and reduction in the number of lymphocytes in spleens of exposed fish occurred after exposure to seven pesticides. Hyperemia in the brains of coho salmon and lake trout exposed to 2,4-D may prove to be of diagnostic value in determining the toxic agent in a fishkill. Behavioral changes could only be properly assessed in laboratory experiments, except for carbaryl (Sevin) and atrazine which cause changes that could be evaluated in the field. Data from these studies and those reviewed were inconcl.. .ive in identifying characteristic lesions from any group or class of pesticide for diagnostic purposes. In all cases, except with carbaryl and atrazine, historical or analytical evidence is necessary to identify the pesticide. (Katz)
W77-02694

**HISTOPATHOLOGICAL EFFECTS OF PESTICIDES AND RELATED CHEMICALS ON THE LIVERS OF FISHES,**
J. A. Couch.
In: The Pathology of Fishes, W. E. Ribelin, ed. The University of Wisconsin Press, Madison, Wisconsin, 1975. p. 559-584. 2 tab., 18 fig., 26 ref.

Descriptors: *Pathology, *Pesticides, *DDT, *Aroclors, *Chlorinated hydrocarbon pesticides, *Organophosphorous pesticides, Reviews, Data collections, *2,4-D, *Endrin, *Bioassay, *Heptachlor, *Insecticides, *Fish diseases, Herbicides, Rainbow trout, Sunfishes.
Identifiers: *Fish livers, Histology, Lindane, Methoxychlor, Telodrin, Malathion, Dursban, Carbaryl, TFM.

A review of controlled field and laboratory research investigating the pathologic effects of pesticides and related chemicals on the livers of fishes is presented. Few fish and pesticides have been tested which may account for the failure to identify specific syndromes resulting from pesticide exposures. Cutthroat trout exposed to endrin had a large spectrum of lesions constituting a prehepatomatous syndrome. Early necrotic, coagulative lesions were associated with the portal triads of rainbow trout exposed to critical levels of lindane. Bluegills exposed to methoxychlor had unique, eosinophilic globular masses in the liver vascular system. The most commonly encountered nonspecific liver lesion for fish following pesticide exposure was fatty change. Further histological and cytological investigation is indicated to further define and characterize effects of pesticides on the livers of fish and to study possible interactions of variables such as nutrition and pesticides. (Katz)
W77-02695

**CELLULAR EFFECTS OF MERCURY ON FISH KIDNEY TUBULES,**
B. F. Trump, R. T. Jones, and S. Sahaphong.
In: The Pathology of Fishes, W. E. Ribelin, University of Wisconsin Press, Madison, Wisconsin, 1975. p. 585-612. 1 tab., 17 fig., 25 ref.

Descriptors: *Osmosis, *Inhibition, *Mercury, *Fish physiology, Pathology, *Fish diseases, *Teleosts, *Cytological studies, *Membrane processes, *Permeability, *Biological membranes, Laboratory tests, Analytical techniques, Methodology, Membrane processes, Heavy metals, Water pollution effects.
Identifiers: *Kidney function(Fish).

Kidney function and structure in teleosts is described. Experiments to further describe kidney function, both in vitro and in vivo are presented, including the effects of several mercury compounds on kidney function in vitro. Mercury is believed to bind with SH groups on surface membrane proteins which may inhibit ATPase. Leak may result with leak-in of sodium and leak-out of potassium with subsequent volume shifts in the cell. Calcification of the mitochondria, one important type of nephrocalcinosis, may occur as a result of high sodium concentrations inhibiting mitochondrial respiration. The basic mechanism of mercurial action is probably due to binding to SH groups. The important lesion is probably an interaction involving cell membrane permeability. (Katz)
W77-02696

**EFFECTS OF TURBIDITY ON VENTILATION RATES AND OXYGEN CONSUMPTION OF GREEN SUNFISH, LEPOMIS CYANELLUS,**
North Texas State Univ., Denton. Dept. of Biological Sciences.
J. D. Horkel, and W. D. Pearson.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 107-113, 1976. 5 fig., 2 tab., 10 ref.

Descriptors: *Turbidity, *Suspended solids, Fish behavior, *Fish physiology, *Adaptation, Environmental effects, *Sunfishes, *Oxygen, *Respiration, Water pollution effects, *Temperature, *Oxygen requirements, Aquatic environment, Metabolism, Laboratory tests, Analytical techniques, Fish.
Identifiers: *Lepomis cyanellus.

Ventilation and oxygen consumption rates of green sunfish exposed to bentonite clay suspensions were measured at several temperatures. Ventilation rates were not affected by bentonite clay suspensions below 2,125 FTU (Formazin Turbidity Units) at 5 C, 1,012 FTU at 15 C, and 898 FTU at 25 C. At turbidity levels exceeding 1,012 FTU at 15 C and 898 FTU at 25 C ventilation rates increased 50-70%. Tests were inconclusive at 35 C due to high mortality. Oxygen consumption rates were not affected by turbid suspensions of up to 3,500 FTU at any of the four temperatures. Evidence suggests that increased ventilation rates under slightly turbid conditions are a means of compensating for reduced respiratory efficiency in order to maintain a constant oxygen uptake. The costs of increased ventilation rates were probably met by a reduction in activity. (Katz)
W77-02697

**CONCENTRATIONS AND CONCENTRATION FACTORS OF HEAVY METALS IN BROWN ALGAE,**
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 5A.
W77-02698

**TOXICITY OF THE SURGEON FISHES-II PROPERTIES OF THE PRINCIPAL WATER SOLUBLE TOXIN,**
Tohoku Univ., Sendai (Japan). Faculty of Agriculture.
T. Yasumoto, R. Bagnis, and J. P. Vernoux.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 42(3), p 359-366, 1976. 1 tab, 3 fig, 12 ref.

Descriptors: *Toxicity, *Mortality, *Public Health, *Marine biology, *Marine fish, *Toxins, *Algal toxins, *Fish toxins, *Venom, Marine microorganisms, Biochemistry, Bioassay, Pollutant idententification.
Identifiers: *Surgeon fish toxicity, Surgeon fish, Ciguatoxin, Mailotoxin, Ichthytoxin, Phytoflagella, Prymnesium parvum.

Specimens of surgeonfish Ctenochaetus striatus collected in Tahiti contained a water-soluble toxin in addition to ciguatoxin. The water-soluble toxin was tentatively named mailotoxin (MT) after the Tahitian name for surgeonfish maito. Purification of MT was achievable by the standard purification procedures for polar lipids. The toxin was eluted from a silicic acid column with chloroform-methanol (6:4) and from a cellulose column with chloroform-methanol-water (5:15:1). Upon gelfiltration through Sephadex G-25, it appeared in the fractions near void volume. Acid hydrolysis of the toxin afforded fatty acids, glucose and galactose, and 15 amino acids. The minimum lethal dose to mice by intraparitonial injection was estimated to be 15 to 20 mg/kg. Guppies put in 40 ppm solitopn of MT died within 150 min. These chemical and physiological properties indicated a close similarity of MT to the ichthyotoxin produced by the phytoflagellate Prymnesium parvum. (Katz)
W77-02700

**STUDIES ON THE METABOLISM OF CHLOROPHENOLS IN FISH-VI TURNOVER OF ABSORBED PHENOL IN GOLDFISH,**
Kyushu Univ., Fukuoka (Japan). Lab. of Fisheries and Chemistry.
K. Kobayashi, H. Akitake, and S. Kimura.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 42, No 1, p 45-50, 2 tab, 2 fig, 6 ref.

Descriptors: *Toxicity, Bioassay, Freshwater fish, Biochemistry, Animal physiology, *Path of pollutants, *Metabolism, Liquid wastes, Laboratory animals, Laboratory tests, Industrial wastes, Organoleptic properties, Taste, *Phenols.
Identifiers: *Chlorophenols, Absorbed phenol, *Goldfish, Excretion, Organ phenol concentration, Biliary excretion, Tissue concentration.

A study has been made regarding the turnover of absorbed phenol in various organs of goldfish, Carassius auratus, during absorption in a phenol-medium (15 ppm) and its subsequent excretion in running water. Although the absorbed phenol accumulated in various organs, the phenol concentration in each organ, except gall bladder, was almost constant after 2 hr of exposure and rapidly decreased after transfer of the fish from the phenol-medium to running water. The phenol concentration in the gall bladder, however, increased with exposure time, even after fish had been transferred to running water, and reached a maximal value of 214.7 microgram/gram at 1-hr culture in running water. The phenol concentration in the gall bladder decreased to 144.7 microgram/gram at the end of the excretion period (for 24 hr), but its amount accounted for 37% of the total phenol detected. The characteristic accumulation of phenol in the gall bladder indicates that the biliary excretion of phenol from the liver, probably after its detoxication by sulfate conjugation, is an important mechanism for the disposition of phenol in fish, as well as for that of pentachlorophenol. (See also W75-10417; W75-10418; W75-10611; and W77-02702) (Katz)
W77-02701

**STUDIES ON THE METABOLISM OF CHLOROPHENOLS IN FISH-VII SULFATE CONJUGATION OF PHENOL AND PCP BY FISH LIVERS,**
Kyushu Univ., Fukuoka (Japan). Lab. of Fisheries and Chemistry.
K. Kobayashi, H. Akitake, and S. Kimura.
Bulletin of the Japanese Society of Scientific Fisheries, Vol. 42(2), 1976, p. 171-177, 1 tab., 4 fig., 14 ref.

Descriptors: *Organoleptic properties, Taste, *Toxicity, Freshwater fish, Biochemistry, Animal physiology, *Path of pollutants, *Metabolism, Laboratory animals, Laboratory tests, Industrial wastes, Trout, Carp, Clams, Lobsters, *Phenols.
Identifiers: *Chlorophenols, Sulfate, Conjugation, Goldfish, Rainbow trout, Spiny lobster, Short-necked clam, Liver, *Pentachlorophenol.

The sulfate conjugation of phenol and pentachlorophenol (PCP) in vitro by liver slices or

homogenates from goldfish, carp, rainbow trout, spiny lobster and shortnecked clam has been studied and compared with that by albino rat liver, using 35S-labeled K2S04. All the liver slices of the test animals showed sulfate conjugation activity with phenol, the level of activity being 1-30% of that in rat liver (approx. 1.8 micro mole/g dry liver/hr). However, the liver homogenates had activities which were markedly lower than those shown by the liver slices. On the other hand, PCP added to the incubation mixture containing liver slices not only did not conjugate with sulfate, but at concentrations higher than 1.4 x 10-6M, it inhibited the sulfate conjugation of phenol. In shortnecked clam and goldfish, absorbed PCP is rapidly excreted after conjugation with sulfate. (See also W75-10417; W75-10418; W75-10611; and W77-02701) (Katz)
W77-02702

**PERSISTENCE OF POLYCHLORINATED BIPHENYLS IN THE HARD-CLAM (MERCENARIA MERCENARIA) AND THE EFFECT UPON THE DISTRIBUTION OF THESE POLLUTANTS IN THE ESTUARINE ENVIRONMENT,**
London Univ. (England). Dept. of Zoology.
W. A. M. Courtney, and G. R. W. Denten.
Environmental Pollution, Vol 10, No 1, p 55-64, 1976. 2 fig, 5 tab, 23 ref.

Descriptors: *Clams, *Aroclor, *Polychlorinaed biphenyls, *Absorption, *Pesticide residues, *Metabolism, *Bioassay, *Persistence, Analytical techniques, Mollusks, Invertebrates, *Path of pollutants, Laboratory tests, Methodology, Distribution.
Identifiers: *Bioaccumulation, *Tissue analysis.

Mercenaria mercenaria fed Aroclor 1254 adsorbed onto the surface of alumina particles at 1.25 and 12.5 parts/109 seawater for 21 days showed a maximum concentration factor of 1.8 x 103 with visceral mass:muscular foot residues of less than 5:1 in general. In clean seawater, only the muscular foot of clams, showed a diminution in PCB content after six months. PCB levels in visceral mass:muscular foot:surface mud for clams in Southampton water are in the ratio of 2:1:2. Tissue samples contained relatively more lower chlorinated isomers compared with the Aroclor standard while feces and mud samples showed an increased proportion of higher chlorinated PCB isomers. Clams may exert both a qualitative and a quantitative effect upon the distribution of PCB in the estuarine ecosystem. (Katz)
W77-02703

**PHYTOPLANKTON PRODUCTION MEASUREMENTS WITH CARBON-14 WITH CONSIDERATION OF LABELED ORGANIC MATTER LOSSES DURING FILTRATION, (IN RUSSIAN),**
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
For primary bibliographic entry see Field 5A.
W77-02704

**OBSERVATIONS ON GAS BUBBLE DISEASE AMONG WILD ADULT COLUMBIA RIVER FISHES,**
Corvallis Environmental Research Lab., Oreg. Western Fish Toxicology Station.
G. A. Bouck, G. A. Chapman, P. W. Schneider, Jr., and D. G. Stevens.
Transactions of American Fisheries Society, Vol 105, No 1, p 114-115, 1976. 6 ref.

Descriptors: Environmental effects, *Fish diseases, Pathology, Dams, *Supersaturation, *Nitrogen, *Gases, *Salmonids, *Sockeye Salmon, *Salmon, *Trout, Fishkill, Sampling, Sport fish, Bubbles, Commercial fish, *Columbia River.
Identifiers: *Gas bubble disease, Emphysema, *Shad, *Steelhead, *Dissolved gases.

A high incidence of gas bubble disease was found among salmonids and shad sampled from the air-supersaturated Columbia River. One sampling in 1972 showed macroscopic dermal emphysema (bubbles) on 47% of sockeye salmon, 40% of steelhead trout (Salmo gairdneri) and 26% of American shad (Alosa sapidissima). No evidence of gas bubble disease was seen on the external surfaces of lampreys. Post-capture eye damage to sockeye salmon, resulting in perforation of the cornea and blindness, may also be related to supersaturation of the river. (Katz)
W77-02705

**LEAD UPTAKE IN TWO MARINE PHYTOPLANKTON ORGANISMS,**
Scripps Institution of Oceanography, La Jolla, Calif.
M. Schulz-Baldes, and R. A. Lewin.
Biological Bulletin, Vol. 150, p. 118-127, February, 1976. 3 tab., 6 fig., 13 ref.

Descriptors: *Adsorption, *Phytoplankton, *Diatoms, *Lead, *Path of pollutants, *Bioassay, *Food webs, *Food chains, Laboratory tests, Chelation, Membrane processes, Analytical techniques, Pollutants.
Identifiers: *Phaeodactylum, *Platymonas, *Binding sites.

The uptake of lead by Phaeodactylum tricornutum and Platymonas subcordiformis, two marine phytoplankton, exposed to lead concentrations ranging from 0.02 to 0.8 mg/l, occurs in two phases. The first phase was completed within minutes after addition of lead and could be described by a Freundlich adsorption isotherm. The number of binding sites per all seemed to be limited. Cells of Phaeodactylum became 'saturated' when the lead burden reached 11,640 micrograms/gr (dry weight). EDTA added to the solution completely inhibits the uptake of lead by Phaeodactylum cells. When diatom cells, pretreated with lead, are resuspended in EDTA, much of the adsorbed lead is eluted with a longer pre-treatment period leading to a higher lead retention by the cell. This suggests that during prolonged exposure to lead solutions the metal ions are first adsorbed to the cell surface and then translocated to within the cell wall, to the plasma membrane, and then to the cytoplasm. (Katz)
W77-02708

**THE MUDDY RUN PUMPED STORAGE PROJECT: A CASE HISTORY,**
Ichthyological Associates, Inc., Drumore, Pa.
T. W. Robbins, and D. Mathur.
Transactions of American Fisheries Society, Vol 105, No 1, p 165-176, 1976. 2 fig, 13 ref.

Descriptors: *Pumped storage, *Reservoirs, *Mortality, Powerplants, Ecology, *Fish reproduction, *Sampling, Biomass, Sport fish, Reproduction, Pump turbines, Water quality, Catfish, Sunfishes, Fish populations, Fish eggs, Larval growth stage.
Identifiers: *Muddy Run Pumped Storage Project(Penn), Pomoxis sp, Ictalurus sp, Susquehanna River, Conowingo Pond(Penn).

The ecology of Conowingo Pond and the Muddy Run Pumped Storage Pond on the lower Susquehanna River was studied to determine the effects of the Muddy Run Pumped Storage Station. Nearly all species of fish present in the lower pond appeared in the upper pond. Extensive sampling in both ponds shows no detrimental effects of station operation in the fishes and fisheries of Conowingo Pond. The upper pond serves as an area where biomass of fishes pumped up from Conowingo Pond can be increased. About 6.5 times as many fish larvae were pumped into the upper pond as left during generation. No estimates could be obtained on the percentage mortality of fishes passing through the pump turbines. The mortality of fishes associated with the operation of the pumped storage station appears to be negligible and screens are not needed for protection. (Katz)
W77-02709

**LETHAL AND PREFERRED TEMPERATURES OF THE ALEWIFE (ALOSA PSEUDOHARENGUS) IN LAKE MICHIGAN,**
Industrial BIO-TEST Lab., Inc., Northbrook, Ill.
R. G. Otto, M. A. Kitchel, and J. O. Rice.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 96-106, 1976. 4 tab., 7 fig., 16 ref.

Descriptors: *Heated water, *Temperature, Environmental effects, *Juvenile growth stage, *Lethal limit, *Mortality, *Seasonal, *Water temperature, *Fish behavior, *Resistance, Aquatic environment, *Electric powerplants, *Lake Michigan, Laboratory tests, Water pollution sources, Water pollution effects, Thermal water, Powerplants, Fish, Food webs, Water quality.
Identifiers: Acclimation, *Temperature preference, *Alewife, *Alosa sp.

The temperature tolerance and temperature preference of mature and young-of-year alewives from Lake Michigan were studied in the laboratory. Critical thermal maxima and incipient upper lethal temperatures increase with acclimation temperature for both mature and young-of-year fish. Critical thermal maxima at equivalent acclimation temperatures are unaffected by age of the fish. Incipient upper lethal limits for young-of-year fish exceed those for mature fish by 3C to 6C. The ultimate lower lethal temperature for mature alewives appears to exceed 3C. Loss of heat tolerance following a 10C decrease in temperature occurs at approximately one-half the rate of gain of heat tolerance following a comparable temperature increase. Preferred temperatures for young-of-year alewives were consistently higher than those of mature fish. Seasonal factors other than lake temperature appear to be of considerable importance in determining preferred temperatures. The results are discussed in terms of potential effects of the heated plume from a nuclear generating station and available field data. (Katz)
W77-02710

**CHANGES IN FISH SPECIES COMPOSITION IN THE AU SABLE RIVER, MICHIGAN FROM THE 1920'S TO 1972,**
Institute for Fisheries Research, Ann Arbor, Mich.
J. S. Richards.
Transactions of American Fisheries Society, Vol. 105, No. 1, 3 tab., 6 fig, p. 32-40, 1976.

Descriptors: habitats, *Rainbow trout, *Brown trout, *Brook trout, *Fish populations, Water quality, Environmental effects, *Trout, *Post-impoundment, Rivers, On-site investigations, Population, Aquatic populations, Pre-impoundment impoundments, Sport fish, Methodology, *Michigan.
Identifiers: *Species diversity, *Au Sable River(Mich).

Fish collections taken in the 1920's from the Au Sable River, Michigan, were replicated in 1972. The Au Sable system as a whole has remained a non-rigorous, predictable environment for fish species. Substantial changes in fish species lists have occurred at most stations. The percentage of cold-water species present in the cold-water, moderate flow areas has increased, while species diversity evenness, and numbers of species have remained constant. The warm headwater areas remain unchanged. Below the impoundments and in the large river areas, water quality has changed with subsequent reductions in species diversity and evenness, and large changes in species lists. (Katz)
W77-02712

**DDE AND LINDANE IN A LARGE-SCALE MODEL LENTIC ECOSYSTEM,**
Purdue Univ., Lafayette, Ind. Dept. of Forestry.
J. L. Hamelink, and R. C. Waybrant.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 124-134, 1976. 1 fig., 5 tab., 32 ref.

Descriptors: *Sediment-water interfaces, *Model studies, *Path of pollutants, *Pesticides, *DDE, *Pesticide residues, *Lentic environment, *Absorption, *Sunfishes, *Rainbow trout, *Trout, *Persistence, *Sediments, Standing waters, Zooplankton, Chlorinated hydrocarbon pesticides, Food webs, Thermal stratification, Quarries, Insecticides, Analytical techniques, Bass, Bottom sediments.
Identifiers: *Bioaccumulation, *Lindane, *Lepomis sp.

The fate of DDE and lindane added to the epilimnion of a thermally-stratified, flooded limestone quarry was followed for one year. DDE was distributed rapidly throughout the system, due to an influx of sediment generated by a rainstorm, while lindane persisted in the epilimnion until turnover. Concentration factors for zooplankton at equilibrium averaged 33 for lindane and 4.5 x 104 for DDE, while the same values for bluegill were 768 and 1.1 x 105, respectively. Rainbow trout planted 134 days after treatment showed a concentration factor for DDE of 1.8 x 105 within 108 days, even though less than 1 part per trillion of DDE remained in the water. The distributions of DDE and lindane in the system were controlled chiefly by sediment-water interactions. (Katz)
W77-02713

**EFFECT OF SHEAR ON EGGS AND LARVAE OF STRIPED BASS, MORONE SAXATILIS, AND WHITE PERCH, M. AMERICANA,**
Maryland Univ., Solomons. Chesapeake Biological Lab.
R. P. Morgan, II, R. E. Ulanowicz, V. J. Rasin, Jr, L. A. Noe, and G. B. Gray.
Transactions of American Fisheries Society, Vol. 10, No. 1, p. 149-154, 1976. 3 tab., 1 fig., 13 ref.

Descriptors: *Fish eggs, Larvae, *Larval growth stage, *Lethal limit, *Environmental effects, *Fish reproduction, *Striped bass, *White perch, Shear, Velocity, Stress, *Shear stress, *Mortality, *Fishkill, Immature growth stage, Laboratory tests, Methodology, Marine fish, Ships, Reproduction, Sea basses, Flow, Pathology, Analytical techniques, Canals.
Identifiers: *Morone sp.

Shear stress, generated by water movement, can kill fish eggs and larvae by causing rotation or deformation. Through the use of an experimental apparatus, a series of shear (as dynes per square cm) - mortality equations for fixed time exposures were generated for striped bass and white perch eggs and larvae. Exposure of striped bass eggs to a shear level of 350 dynes per square cm killed 36% of the eggs in 1 min, 69% in 2 min., and 88% in 4 min. Exposure of larvae to the same conditions kills 9.3% in 1 min., 30.0% in 2 min, and 68.1% in 4 min. White perch eggs exposed to a shear level of 350 dynes per square cm were killed at a rate of 38% in 1 min., 41% in 2 min., 89% in 5 min., 96% in 10 min and 98% in 20 min. White perch larvae exposed to the same conditions were killed at a rate of 38% in 1 min., 52% in 2 min., and 75% in 4 min. Results are used in conjunction with the determination of shear levels in the Chesapeake and Delaware Canal and ship movement for the estimation of egg and larvae mortalities in the field. (Katz)
W77-02714

**THE SMITH MOUNTAIN - LEESVILLE PROJECT: A CASE HISTORY,**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
G. M. Simmons, Jr.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 1972-180, 1976. 5 fig., 1 tab., 22 ref.

Descriptors: *Thermal stratification, *Reservoirs, *Powerplants, *On-site investigations, *Primary productivity, *Water quality, *Pumped storage, *Reservoir operation, *Recirculated water, Water treatment, Water circulation, Impoundments, Standing crop, *Virginia, Recycling.
Identifiers: *Smith Mountain-Leesville Project(Va), Roanoke River(Va), Blackwater River(Va).

The Smith Mountain Pump Storage Project consists of two reservoirs in tandem on the Roanoke and Blackwater Rivers approximately 64 km southeast of Roanoke, Virginia. The reservoirs have provided sites for evaluating the impact of pump storage operation on primary productivity, fisheries, and water quality. Due to the location of the dam and the dendritic nature of the basin, the effect of recycling to alleviate detrimental water quality effects caused by thermal stratification were minimal. Moreover, as might be expected, the quality of water found in the upper reservoir depends upon the quality of water being recycled from the lower impoundment. Recycling appears to enhance primary productivity rates, at least in the vicinity of the dam. Pump storage operation does not appear to detract from the fishery in either reservoir. Although comprehensive studies are still needed in many areas, the results of all studies to date indicate a net beneficial effect of pump storage operation on environmental quality. (Katz)
W77-02715

**TOXICITY OF WATER-SOLUBLE FRACTIONS OF FOUR TEST OILS FOR THE POLYCHAETOUS ANNELIDS, NEANTHES ARENACEODENTATA AND CAPITELLA CAPITATA,**
Texas A and M Univ., College Station. Dept. of Biology.
S. S. Rossi, J. W. Anderson, and G. S. Ward.
Environmental Pollution, Vol. 10, p. 9-17, 1976. 2 fig., 2 tab., 12 ref.

Descriptors: *Benthic fauna, *Benthos, *Oil wastes, *Mortality, *Toxins, Pollutants, *Toxicity, *Bioassay, *Annelids, *Bioindicators, *Lethal limit, Laboratory tests, Water pollution sources, Invertebrates, Worms, Environmental effects, Water pollution effects, *Pollutant identification.
Identifiers: *Neanthes sp., *Capitella sp., Polychaetes, Naphthalenes.

The toxicity of water-soluble fractions of two refined and two crude oils to two species of laboratory-reared polychaetes was determined. The two refined oils (No. 2 fuel oil and bunker 'C' residual oil) proved most toxic to both species. South Louisiana crude oil was less toxic than either of the refined oils, yet more toxic than Kuwait crude oil. The higher concentrations of toxic diaromatic compounds (naphthalenes) found in refined oils probably accounted for major differences between the toxicity of refined versus crude oils. Capitella capitata was slightly more sensitive to three of the four oils than was Neanthes arenaceodentata. Both species appear to be similar to fish and crustaceans in their sensitivity to these four oils. (Katz)
W77-02716

**COMPARISON OF 115M CD ACCUMULATION FROM SEDIMENTS AND SEA WATERS BY POLYCHAETE WORMS,**
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
For primary bibliographic entry see Field 5B.
W77-02717

**EDWARDSIELLA TARDA FROM AN EPIZOOTIC OF MULLETS (MUGIL CEPHALUS) IN OKITSU BAY, (IN JAPANESE),**
Kochi Univ. (Japan). Dept. of Cultural Fisheries.
R. Kusada, T. Toyoshima, Y. Jwamura, and H. Sako.
Bulletin of the Japanese Society of Scientific Fisheries, Vol. 42, No. 3, 1976, p. 271-276, 1 fig., 12 ref.

Descriptors: *Mortality, *Marine fish, *Marine fisheries, *Animal diseases, *Fish diseases, Microbiology, Aquatic microbiology, Marine bacteria, Microorganism, Fishkill, *Epizootiology.
Identifiers: *Mullets, Mugil cephalus, Japan, *Okitsu Bay(Japan), *Edwardsiella tarda.

During the period from late September through early October 1973, an epizootic occurred among mullet populations in a bay in Kochi Prefecture. Dying fish displayed erratic swimming and a more or less whirling motion at the surface. Affected fish had large malodorous abscesses with hemorrhagic borders in the body surface. The etiological agent was isolated from the kidney of diseased mullets. These organisms were gram-negative motile peritrichously flagellated rods, not encapsulated, and measuring about 0.8 x 0.4 u. The bacteria grew slowly on nutrient agar requiring 48 hr of incubation at 25C to form the typical small (0.5 mm in diameter), circular, transparent, slightly raised colonies. They gave negative oxidase reaction, positive catalase reaction, utilized glucose fermentatively and reduced nitrate to nitrite. They did not utilize citrate and malonate as a sole carbon source. No actions on d-tartrate and mucate were exhibited. The organisms were the production of hydrogen sulfide in TSI agar and indole in tryptone water positive to methyl red test, negative to VP reaction, decarboxylation of lysine and ornithine, and utilization of fructose, galactose, mannose and glycerol. They were sensitive to streptomysin, kanamycin, chloramphenol, furazolidon and nalidix acid. (Katz)
W77-02718

**BIOSYNTHESIS OF ORGANIC ARSENIC COMPOUNDS IN BROWN TROUT (SALMO TRUTTA),**
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
W. R. Penrose.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2385-2390, 1975. 2 fig., 3 tab., 15 ref.

Descriptors: *Traces, *Brown trout, *Arsenic compounds, *Fish physiology, *Path of pollutants, *Metabolism, Arsenic radioisotopes, Laboratory tests, Methodology, Biochemistry, Organic compounds.
Identifiers: *Biosynthesis.

Radioactive, inorganic arsenic was administered to brown trout (Salmo trutta) orally and by intramuscular injection. The orally administered arsenic appeared in the tissues in an altered form that is presumed organic; this organoarsenical was also found in the gastrointestinal contents. The injected arsenic appeared in the tissues in inorganic form and was only slowly converted to organic form. Large amounts of inorganic and organic arsenic were detected in the bile. These findings are consistent with biosynthesis of the organic arsenic compound within the gastrointestinal tract. (Katz)
W77-02719

**AQUEOUS AMMONIA EQUILIBRIUM CALCULATIONS: EFFECTS OF PH AND TEMPERATURE,**
Montana State Univ., Bozeman. Dept. of Chemistry.
K. Emerson, R. C. Russo, R. E. Lund, and R. V. Thurston.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2379-2383, 1975. 1 tab., 15 ref.

Descriptors: *Ammonia, *Acidity, *Temperature, Analytical techniques, *Reviews, *Hydrogen ion concentration, *Equilibrium, *Aqueous solutions, Mathematical models, Toxins, *Toxicity, Nitrogen compounds, Lethal limit.

The toxicity of ammonia to fishes has been attributed to the un-ionized ammonia chemical species present in aqueous solution. Because the percent of total ammonia present as un-ionized ammonia (NH3) is dependent on pH and temperature, an exact understanding of the aqueous ammonia equilibrium is important for toxicity studies. A critical evaluation of the literature data on the ammonia-water equilibrium system has been carried out. Results of calculations of values of pKa at different temperatures and of percent of NH3 in aqueous ammonia solutions of zero salinity as a function of pH and temperature are presented. (Katz)
W77-02720

**STUDIES ON THE CHEMICAL BEHAVIOR OF 106-RU IN SEA WATER AND ITS UPTAKE BY MARINE ORGANISMS -I, ACCUMULATION AND EXCRETION OF 106-RU BY CLAM,**
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
M. Ishikawa, T. Koyanagi, and M. Saiki.
Bulletin of the Japanese Society of Scientific Fisheries, Vol. 42(3), 1976, p. 287-297. 4 tab., 6 fig., 9 ref.

Descriptors: *Metals, *Path of pollutants, Invertebrates, Mollusks, *Water quality, Sea water, *Clams, Laboratory tests, *Physiology(Animal), Biochemistry, *Absorption, *Radioactivity.
Identifiers: *Ruthenium radioisotopes, 106-Ruthenium, Meretrix, Biological half-life, Soft tissues.

Accumulation and excretion of 106-Ru by the clam, Meretrix meretrix lusoria, were investigated in relation to the chemical forms under laboratory condition. A little difference in the biological uptake was observed only when 106-Ru was prepared to the chemical form of 106-RuNO.C1x. Accumulation seemed to be attributable to the specific surface area of tissues or the physiological activities of organs of the clam. Reared for 100 days, the edible part of the clam represented the radioactivity ratio of 4.9. In general, radioactivity loss from the cam was relatively rapid for the chemical form of prep'd 106-RuNO.C1x. After 40 days, approximately 25% of accumulated prep'd 106-Ru was lost from the whole body of the living clam. The lost radio-activity, especially in the initial experimental stage, was not due to the desorption from the shell but to the biological activities of soft tissues of the clam. The biological half lives were also discussed in relation to the chemical forms. The loss curves obtained with the whole body clam consisted of two components, whereas that with the soft tissues were classified into three components. (Katz)
W77-02722

**THE ECOLOGY OF AN ARTIFICIAL COOLING LAKE,**
R. W. Harmsworth.
Verhandlungen Internationale Vereigung fur theorelische und ungiwandte Limnologie, Vol. 19, p. 2189-2200, November, 1975, 6 fig., 7 tab., 9 ref.

Descriptors: *Temperature, Plankton, *Zooplankton, *Electric powerplants, *Phytoplankton, *Benthos, *Cooling water, Lakes, *Artificial lakes, Water quality, On-site investigations, *Thermal water, Size, Powerplants, *Recreation, Environmental effects, Aquatic populations, Chlorinated hydrocarbon pesticides, *Thermal pollution, *Illinois.
Identifiers: *Lake Sangchris(Ill).

In an attempt to clarify the impact of thermal discharges from electric power utilities on aquatic ecosystems, a summary of studies undertaken by a private firm is presented. The history and development of Lake Sangchris in central Illinois as a closed cycle cooling lake is presented as well as the ecology, water chemistry, plankton, benthos and fishery resource. Phytoplankton and zooplankton present in Lake Sangchris were uniformly of small size and eutrophication was not apparent as might be expected from high nutrient levels and temperatures in the lake. The gizzard shad, a filter feeder, is possibly the cause of this situation. Benthic populations increased perhaps due to discontinued use of chlorinated pesticides by farmers. The fishery in Lake Sangchris consists of 18 species which includes native species as well as largemouth bass and channel catfish which were stocked. The lake is successfully used not only as a cooling system, but also for recreation. (Katz)
W77-02723

**SOME ENVIRONMENTAL AND TOXICOLOGICAL ASPECTS OF TRI-ARYL PHOSPHATE SYNTHETIC OIL,**
R. Wageman.
Verhandlungen Internationale Vereinigung fur Theoretische und ungewandle Limnologie, Vol 19, p 2178-2184, November, 1975. 3 fig, 3 tab, 6 ref.

Descriptors: Oil, *Toxicity, *Phosphates, *Water pollution effects, *Bioassay, *Rainbow trout, *Oil pollution, *Hydrolysis, Environmental effects, Oil spills, *Oil wastes, Laboratory tests, Chemical degradation, *Phosphorous compounds, Water pollution sources.
Identifiers: *Tri-aryl phosphate oil, *Synthetic oil.

A synthetic oil, tri-aryl phosphate, was examined, as a representative of synthetic oils used in industry, for its toxicity to fish and for its rate of hydrolysis in river water. A commercial synthetic tri-aryl phosphate oil with the brand name IMOL S-140 was used. A half-life of 96 days was obtained and the resulting production of phosphate was negligibly small. Toxicity tests with guppies showed that IMOL was not acutely toxic but long-term exposure of four months produced symptoms of chronic-poisoning in rainbow trout. Enlarged livers developed, internal tissue turned blue-gray and enzyme activities of LDH and GOT increased abnormally. (Katz)
W77-02724

**AVOIDANCE OF LIME-NEUTRALIZED IRON HYDROXIDE SOLUTIONS BY COHO SALMON IN THE LABORATORY,**
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
K. F. Updegraff, and J. L. Sykora.
Environmental Science and Technology, Vol. 10, No. 1, p. 51-54, January, 1976. 2 tab., 3 fig., 10 ref.

Descriptors: *Salmon, *Fish behavior, *Environmental effects, *Water quality, *Acidic water, *Water pollution effects, Salmonids, Laboratory tests, Fish, Iron, Bioassay, Hydrogen ion concentration, Methodology, Water quality, *Acid mine water, *Coal mine wastes, *Iron oxides.
Identifiers: *Coho Salmon, *Avoidance(Fish).

Laboratory avoidance studies showed that coho salmon raised in clean water exhibit a definite response to lime-neutralized iron hydroxide suspensions at the range of 4.25-6.45 mg Fe/1. The same species of fish, exposed to different concentrations of the pollutant for several months, responded in almost the same way as control fish. (Katz)
W77-02725

**PLANKTON INVESTIGATIONS NEAR FLEVO POWER STATION,**
F. B. J. Koops.
Verhandlungen Internationale Vereingung fur theroelische and ungewandte humnulogie, Vol. 19, p. 2207-2213, November, 1975. 2 tab., 5 fig., 1 ref.

Descriptors: *Diatoms, *Plankton, *Powerplants, *Temperature, *Cooling water, *Aquatic populations, *Plant populations, *Environmental effects, Primary productivity, Methodology, Phytoplankton, Aquatic microorganisms.
Identifiers: Diatoma sp., *Asterionella sp., Mechanical damage.

Changes in species composition of plankton around the Flevo power station in the Netherlands were investigated with special attention to Asterionella formosa and Diatoma elongatum. No correlation between water temperature and the number of species found or between water temperature and relative abundance was observed. Microscopic examinations of samples showed no apparent increase in the number of dead or damaged cells. (Katz)
W77-02726

**CHLORINE-CONTAINING STABLE ORGANICS: NEW COMPOUNDS OF ENVIRONMENTAL CONCERN,**
C. W. Gehrs, and R. L. Jolley.
Verhandlungen Internationale Vereinigungfur Theoretische und ungewandte Limnologie, Vol. 19, p. 2185-2188, November, 1975. 3 fig., 5 ref.

Descriptors: *Organic compounds, Resistance, *Chlorination, *Pesticide residues, *Lethal limit, *Food chains, *Food webs, Environmental effects, *Daphnia, *Bioassay, *Reproduction, *Mortality, Pollutants, Plankton, Aquatic life, Water purification, Chlorine, Water pollution sources.
Identifiers: *Sublethal effects, 4-chlororesorcinol, 5-chlorokuvacil.

Chlorine-containing stable organics are formed when chlorine is added to water containing high concentrations of organics. Maturation and survival of Daphnia magna were evaluated after exposure to several concentrations of two chlorine-containing stable organics. A dose-response relationship was found with all concentrations of 4-chlororesorcinol with increased concentrations causing a decrease in time to LC50. Survival was not affected by 5-chlorouracil at concentrations tested. Reproduction was inhibited by 4-chlororesorcinol and stimulated at lowest concentrations for 5-chlorouracil. (Katz)
W77-02727

**MACROZOOBENTHIC SPECIES ASSEMBLAGES OF SOUTHEASTERN LAKE MICHIGAN, U.S.A.,**
For primary bibliographic entry see Field 2H.
W77-02728

**EFFECTS OF SELECTED WATER TOXICANTS ON THE IN VITRO ACTIVITY OF FISH CARBONIC ANHYDRASE,**
National Water Quality Lab., Duluth, Minn.
G. M. Christensen, and J. H. Tucker.
Chemical-Biological Interactions, Vol. 13, p. 181-192, 1976. 11 fig., 1 tab., 49 ref.

Descriptors: *Enzymes, *Inhibitors, Biochemistry, *Kinetics, Water quality, *Heavy metals, *Mode of Action, Water pollution sources, *Respiration, Laboratory tests, Analytical techniques, Cations, Pesticides, Organic compounds, Toxins, Channel catfish, DDT, Mercury, Cadmium, Diazinon.
Identifiers: *Carbonic anhydrase, Sevin, Lindane.

Carbonic anhydrase (CA, carbonate hydro-lyase EC 4.2.1.1) from lysed red blood cells of the channel catfish (Ictalurus punctatus) was studied to determine physico-chemical kinetic properties and relative sensitivity to 56 chemicals of significance

in water quality research. In general, enzyme activity was strongly reduced by heavy metal inorganic cations; less strongly by organometallic cations, some anions, and certain pesticides; and weakly inhibited by light metal cations and organometallic and organic compounds. Dose-response curves were qualitatively similar in most cases. (Katz)
W77-02730

**BIOACCUMULATION OF MERCURY IN MYOXOCEPHALUS QUADRICORNIS (L.) (TELEOSTEI, COTTIDAE) IN AN UNPOLLUTED AREA OF THE BALTIC,**
Helsinki Univ. (Finland). Dept. of Environmental Science.
P. Nuorteva, and E. Hasanen.
Ann. Zool. Fennici, Vol. 12, p. 247-254, 1975, 1 fig., 4 tab., 48 ref.

Descriptors: *Mercury, *Path of pollutants, *Absorption, *Sculpins, Environmental effects, Habitats, *Food webs, Analytical techniques, Invertebrates, *Marine fish, Methodology, Size, Metabolism, Teleosts.
Identifiers: *Myoxocephalus quadricornis, *Bioaccumulation, Tissue analysis, *Baltic Sea(Bromarv area).

The mercury content of organisms in the unpolluted Bromarv area of the Baltic ranged from 0.03 ppm in invertebrates to 0.29 ppm in the flesh of piscivorous fishes to 2 ppm in the flesh of fish-eating migratory birds. The mercury content of the stenothermal fish, Myoxocephalus quadricornis increased with size to a maximum of 0.47 ppm. Observations from an area moderately polluted with mercury showed an accelerated accumulation of mercury. This indicates that the balanced natural condition of mercury circulation is characterized by regression coefficients near zero. The exceptionally stron bioaccumulation of mercury by M. quadricornis is probably a result of its feeding on mysids which have a higher mercury content than other invertebrates. (Katz)
W77-02731

**BIOCHEMICAL EFFECTS OF METHYLMERCURIC CHLORIDE, CADMIUM CHLORIDE, AND LEAD NITRATE ON EMBRYOS AND ALEVINS OF THE BROOK TROUT, SALVELINUS FONTINALIS,**
National Water Quality Lab., Duluth, Minn.
G. M. Christensen.
Toxicology and Applied Pharmacology, Vol. 32, 1975, p. 191-197, 2 tab., 18 ref.

Descriptors: *Mercury, Cadmium, Lead, Freshwater fish, Physiology, Bio-chemistry, *Brook trout, Growth rates, Growth stages, Proteins, Water pollution, *Water pollution effects, *Path of pollutants, *Toxicity, *Bioassays, Enzymes, Life cycles, *Chlorides, *Nitrates.
Identifiers: Biochemical responses, Salvelinus fontinalis, *Methylmercuric chloride, *Cadmium chloride, *Lead nitrate.

Brook trout (Salvelinus fontinalis) embryos and alevins were exposed to methylmercuric chloride (0.010-1.03 ppb of Hg), cadmium chloride (0.035-3.43 ppb of Cd), and lead nitrate (plumbous, 0.057-530 ppb of Pb) as a part of a study to evaluate biochemical responses to three important water pollutants during early stages of life. After exposures of 16-17 days for embryos and continuing to 21 days after hatching for alevins, biochemical analyses were carried out. The factors measured were weight, protein, glutamic oxaloacetic transaminase, alkaline phosphatase, acetylcholine esterase and adenosine-5'-triphosphate (ATP). A statistical evaluation ($p<0.05$) of the results from control and exposed specimens showed one change for embryos: a decrease in GOT activity in response to 1.03 ppb of CH3Hg(II). Thirteen changes were found for alevins: a decrease in weight in response to CH3Hg(II), Cd(II), and Pb(II); an increase in protein content in response to Cd(II); an increase in GOT activity in response to CH3Hg(II) and Cd(II); an increase in ALP activity in response to Cd(II) and Pb(II); and an increase in ACH activity in response to Cd(II) and Pb(II). (Katz)
W77-02732

**THE EFFECTIVENESS OF THE FINNISH ANTI-MERCURY MEASUREMENTS IN THE MODERATELY POLLUTED AREA OF HAMEENKYRO, (IN FINNISH),**
Helsinki Univ. (Finland). Dept. of Environmental Science.
P. Nourteva, E. Hasanen, and S. L. Nourteva.
Ymparisto ja Terveys, 1975, Vol. 6, No. 8, p. 611-635, 7 tab., 29 ref.

Descriptors: *Mercury, Metals, *Path of pollutants, Water pollution effects, *Public health, Freshwater fish, Water pollution control, Pathology, Biochemistry, Neutron activation analysis, *Human diseases, Human pathology, Insects, *Pulp wastes, Pulp and paper industry, *Heavy metals.
Identifiers: *Methylmercury, *Finland, Mercury transfer, Sarcophagous flies, Mercury half life.

The reduction of use of mercury slimicides in pulping operation in Finland has resulted in a decrease of tissue mercury content in fresh-water fish of about 0.2 ppm/year. Decrease in the mercury content of hair in the people who had stopped eating fish was observed. The mercury content of sarcosoprophagous flies reared in fish with different degrees of mercury contamination was observed. (Katz)
W77-02733

**POLYHALOGENATED MONOTERPENES FROM THE RED ALGA, PLOCAMIUM CARTILAGINEUM,**
Scripps Institution of Oceanography, LaJolla, Calif.
J. S. Mynderse, and D. J. Faulkner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 871, Price codes: A02 in paper copy, A01 in microfiche.
Tetrahedron, Vol 31, 1975, p 1963-1967, 1 tab, 2 fig, 11 ref.

Descriptors: *Rhodophyta, Mollusks, Organic compounds, *Chlorinated hydrocarbons, Polymers, Algae, *Biochemistry, *Chemical analysis, Spectroscopy, *Bromine, *Halogens, Chlorine, *Plant physiology, Plant growth substances, *Marine algae, California.
Identifiers: *Polyhalogenated monoterpenes, Plocamium cartilagineum, *Sea hare, Aplysia californica, Digestive gland, Molecular formulas.

Mixtures of polyhalogenated monoterpenes, first observed among the constituents of the digestive gland of the sea hare Aplysia californica, have been isolated from Plocamium species. The structures of eleven polyhalogenated monoterpenes from Plocamium cartilagineum have been determined by spectroscopic methods. All structures are based on the 3,7-dimethyl-1,5,7-octatriene skeleton. (Katz)
W77-02734

**EFFECTS OF WATER QUALITY ON LARVAL SETTLEMENTS IN LOS ANGELES HARBOR AS DETERMINED BY MULTIVARIATE STATISTICAL TECHNIQUES,**
University of Southern California, Los Angeles. Allan Hancock Foundation.
D. F. Soule, R. R. Emerson, J. D. Soule, R. W. Smith, and M. Oguri.
IEEE Ocean, p. 913-918, 1975. 3 tab., 3 fig., 11 ref.

Descriptors: *Dissolved oxygen, *Temperature, *Salinity, Water quality, *Larvae, *Turbidity, Hydrogen ion concentration, Analytical techniques, *Statistical methods, *Distribution, Environmental effects, Water pollution effects, On-site data collections, Monitoring, *California, Primary productivity, Distribution patterns, Spatial distribution, Larval growth stage.
Identifiers: *Los Angeles Harbor(Calif).

Settling racks placed at different locations in Los Angeles Harbor and representing a variety of water quality conditions were monitored for larval settlement over a two year period. Temperature, salinity, pH, dissolved oxygen, primary productivity, nitrates, nitrites, NH3 and sediment chemistry were determined. Multivariate statistical techniques were applied in order to define the major physical parameters affecting larval distribution and settlement. The major abiotic parameters which contribute to the environmental gradient within the study area were temperature and dissolved oxygen. Higher temperatures and lower dissolved oxygen levels within the inner harbor were modified with incoming seawater from the outer and outside harbor areas. Secondary factors include turbidity and salinity. (Katz)
W77-02735

**PLANKTON PHOTOSYNTHESIS AND DEGRADATION IN THE KAPCHAGAI RESERVOIR IN THE THIRD YEAR OF ITS EXISTENCE, (IN RUSSIAN),**
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. of Microbiology and Virology.
N. K. Gulaya, and N. L. Tyuten'Kova.
Gidrobiol Zh 11(3), p 43-46, 1975.

Descriptors: *Plankton, *Photosynthesis, *Productivity, Degradation(Decomposition), Reservoirs, *Biodegradation decomposing organic matter.
Identifiers: Kapchagai reservoir(Kazakh-SSR), USSR.

Photosynthetic production and degradation of organic matter in the Kapchagai reservoir in the Alma-Ata district of the Kazakh SSR (USSR) have been determined regularly since it was first filled in 1970. The results of the 3rd survey, carried out in May, July and Oct. 1972, are given. In all seasons degradation exceeds plankton photosythesis. In spring degradation is almost twice production. In summer degradation and production are about the same. In fall degradation exceeds production by a factor of 1.5.--Copyright 1976, Biological Abstracts, Inc.
W77-02737

**COMPUTERIZED SCHEME FOR THE IDENTIFICATION OF AEROMONADS AND MEMBERS OF THE FAMILY ENTEROBACTERIACEAE,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02758

**NTA (NITRILOTRIACETIC ACID) - AN ECOLOGICAL APPRAISAL,**
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W77-02770

**A BENTHIC SURVEY OF FLAT CREEK AND THE SALT RIVER NEAR THAYNE, WYOMING.**
Environmental Protection Agency, Denver, Colo. Technical Support Branch.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 804, Price codes: A02 in paper copy, A01 in microfiche.
Report No. SA/TSB-14, February 1973. 16 p. 1 fig., 6 tab.

Descriptors: *Benthos, *Organic wastes, Rivers, *Productivity, *Wyoming, Dissolved oxygen, Sewage effluents, Mayflies, Caddisflies, Oligochaetes, Midges, Aquatic insects, *Farm wastes, Dairy industry.
Identifiers: *Dairy wastes, Flat Creek(Wyo), Salt River(Wyo), Thayne(Wyo), Blackflies.

Sampling results showing the effects of dairy sewage and whey discharges on stream benthic communities (Ephemeroptera, Tricoptera, Plecoptera, Hemiptera, Coleoptera, Diptera, Oligochaetes, and Annelida) are presented. The station immediately adjacent to the outfall was covered with a thick layer of congealed whey for approximately 50 yards downstream, with a significant reduction of all organisms--the result of the smothering effect of the whey. At 300 yards downstream, large increases in the average number of mayflies, blackflies, and midges were observed, due to the enrichment of the sewage portion of the effluent, as evidenced by substantial increases in organic carbon, total nitrogen, and phosphorus. Two miles downstream from the discharge, the quantity of mayflies, blackflies, and midges was significantly higher than the upstream control station. The only evident detrimental effect of the effluent was the smothering by the congealed whey at the station closest to the discharge, but no blanketing effect was observed at the downstream stations. The reduction of dissolved oxygen from an average of 8.0 mg/l at the control station to an average of 5.7 mg/l at the second sampling station did not produce gross detrimental effects on the benthic community. (Auen-Wisconsin)
W77-02807

**SPATIAL AND TEMPORAL VARIATIONS IN THE INTERSTITIAL WATER CHEMISTRY OF CHESAPEAKE BAY SEDIMENTS,**
Johns Hopkins Univ., Baltimore, Md.
G. Matisoff, O. P. Bricker, G. R. Holdren, and P. Kaerk.
Available from the National Technical Information Service, Springfield Va 22161, as COO 327 918, Price codes: A02 in paper copy, A01 in microfiche. Report CONF-750410-7 (undated). 16 p. 16 fig., 24 ref. AEC AT(11)-3292.

Descriptors: *Chemical properties, *Chesapeake Bay, *Bottom sediments, Estuaries, *Temporal distribution, *Spatial distribution, Oxidation reduction potential, Hydrogen ion concentration, Chlorides, Alkalinity, Sulfates, Phosphates, Iron, Ammonia, Silicates, Manganese, Cores, Bicarbonates.

Core analyses to calculate the chemical mass balance relations in estuaries based on spatial and temporal variability of the concentrations of dissolved species in the sediment, and their interactions, are described. Data reliability is contingent upon navigational accuracy which limits relocation of sample sites and variations in temperature, salinity, and sediment deposition rates, which are dependent on time cycles, and which, in turn, influence both the biological and inorganic processes taking place within the cores. The oxidation reduction potential, hydrogen ion concentration chloride, silicate, sulfate, carbonate alkalinity, ammonia, phosphate, iron and manganese were calculated and compared to the analytical techniques. The spatial variations were only slightly greater than the limits set by the analytical techniques. However, groundwater infiltration can severly affect the interstitial water chemistry and may be an important influence in some areas; also the distribution of some chemical species is controlled by local mineral equilibria, which decreases the reproducibility of spatial data. Temporal variations greatly exceeded the limits of spatial variations for each chemical specie. For parameters which are conservative and/or influenced predominantly by incrganic activity, seasonal changes in salinity and temperature control the interstitial water profiles. Those species which are involved in the decomposition of organic matter also showed a gross seasonal correlation. (Auen-Wisconsin)
W77-02808

**ON THE HABITABILITY OF MARS, AN APPROACH TO PLANETARY ECOSYNTHESIS.**
Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 6G.
W77-02810

**CONCENTRATIONS OF COPPER, IRON, LEAD, NICKEL AND ZINC IN FRESHWATER ALGAL BLOOMS,**
University Coll. of Swansea (Wales). Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 5A.
W77-02813

**NITROGEN IN SEDIMENTED ORGANIC MATTER FROM LAKE ONTARIO,**
Canada Centre for Inland Waters, Burlington (Ontario).
A. L. W. Kemp, and A. Mudrochova.
In: Proceedings of the International Meeting on Humic Substances, Nieuwersluis, Netherlands, 1972, p. 137-157. 9 fig., 10 tab., 47 ref.

Descriptors: *Nitrogen compounds, *Lake Ontario, *Lake sediments, Amino acids, Humic acids, Analysis, Fulvic acids, *Organic matter, *Nitrogen, Water pollution effects.

Preliminary results of an ongoing study to determine the nature of the nitrogenous fraction of sedimented organic matter from Lake Ontario indicated that the insoluble, combined amino acids account for 45% of the total nitrogen in the bottom sediments; combined amino sugars (10%), fixed ammonium nitrogen (6%) and exchangeable ammonium-N (2%) comprise the balance of the known nitrogen compounds, leaving about 36% of the nitrogen which cannot be identified. The sediment contained three times more fulvic than humic acids, both of which are extractable in dilute sodium hydroxide. The distribution of individual protein and non-protein amino acid residues in the humic and fulvic acids on a relative basis is similar to that found in the whole sediment, in algae, zooplankton, and bacteria. Furthermore the relative abundance of amino acid residues found in the sediments is close to that reported for several Canadian soil types, except for a rather high nitrogen content, which, it is theorized, is due to the relatively larger protein content of the lake's seston. Infra-red spectra suggested the presence of polypeptides as well as proteins and polysaccharides. The polypeptide nature of the sediment fulvic acids and combined soluble amino acids was also suggested by the release of free amino acids with a proteolytic enzyme. (Auen-Wisconsin)
W77-02815

**EVALUATION OF THE PHYTOPLANKTON BIOMASS IN LAKES OF THE WORLD, (IN RUSSIAN),**
Belorussian State Univ., Minsk (USSR).
For primary bibliographic entry see Field 2H.
W77-02816

**THE EFFECT OF DISSOLVED ORGANIC MATTER IN SEA WATER ON THE UPTAKE OF MIXED INDIVIDUAL HYDROCARBONS AND NUMBER 2 FUEL OIL BY A MARINE FILTER-FEEDING BIVALVE (MERCENARIA MERCENARIA),**
Rhode Island Univ., Kingston. Graduate School of Oceanography.
P. D. Boehm, and J. G. Quinn.
Estuarine and Coastal Marine Science, Vol. 4, No. 1, p. 93-105, 1976. 5 fig., 1 tab., 31 ref. R803415-01-0.

Descriptors: *Organic matter, *Sea water, *Oil, *Clams, *Absorption, Solubility, Aromatic compounds, Organic compounds, Dissolved solids.
Identifiers: *Dissolved organic matter, Number 2 fuel oil.

The presence of naturally-occuring dissolved organic matter (DOM) in sea water significantly inhibits the uptake by the clam (Mercenaria mercenaria) of certain saturated hydrocarbons. In laboratory studies, the bivalves were placed in test solutions consisting of seawater in which n-hexadecane, phenanthrene and No. 2 fuel oil were mixed. One test solution contained seawater which had been treated with activated charcoal to reduce the DOM content. Clams which had ingested the seawater with reduced DOM content underwent a statistically significant increase in hexadecane uptake, a 17-fold increase in the uptake of the 'saturated' fraction of the fuel oil and a 5-fold increase in the uptake of the 'aromatic' fraction. However, there was no variance in the test results in phenanthrene. Average uptake of the total fuel oil hydrocarbon was seven times greater for the bivalves in the reduced-DOM test. The results suggest that DOM in seawater solubilizes saturated hydrocarbons and makes them less readily taken up by the clams. (Harris-Wisconsin)
W77-02817

**PROBLEMS IN THE MONITORING OF BIOMASS,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02818

**EFFECTS OF PASSAGE THROUGH POWER PLANT COOLING SYSTEMS ON ESTUARINE COPEPODS,**
Maryland Univ., Solomons. Chesapeake Biological Lab.
D. R. Heinle.
Environmental Pollution, Vol. 11, No. 1, p. 39-58, 1976. 3 fig., 11 tab., 20 ref.

Descriptors: *Water pollution effects, *Powerplants, *Copepods, *Chesapeake Bay, Entrainment, Cooling water, Intakes, *Maryland, Chlorine, Heated water, Analytical techniques, Sampling.

The effects of chlorination, heated water, and entrainment on the copepods Scottolana canadensis, Eurytemora affinis and Acartia tonsa, at three power plant sites in Chesapeake Bay were measured by vital staining, a technique that allowed the examination of more individual organisms for viability or mortality. The Vienna plant (located at the Nanticoke River) with the greatest temperature rise, highest absolute temperatures, lowest salinities, and no chlorination, caused no detectable mortalities. At the Clark Point plant (located on the Patuxent River) there were slight mortalities with no chlorination and substantial mortalities occurred only during chlorination. At the Morgantown site (located in Maryland below the Route 301 bridge across the Potomac River estuary) significant mortalities occurred only when chlorine was used. In addition to the slight mortalities caused by temperature alone and the clear effects of chlorine, the data suggested a difference in sensitivity of the three species. In order of increasing sensitivity they are: S. canadensis, E affinis and A. tonsa. The statistical problems associated with precise estimates of numbers of organisms passing through the Morgantown plant are presumed to be due to inadequate sampling efforts and the lack of prior knowledge of the copepod distribution. (Auen-Wisconsin)
W77-02820

**CHEMICAL AND PHOTOCHEMICAL TRANSFORMATION OF SELECTED PESTICIDES IN AQUATIC SYSTEMS,**
Environmental Research Lab., Athens, Ga.

N. L. Wolfe, R. G. Zepp, G. L. Baughman, R. C. Fincher, and J. A. Gordon.
Report No. EPA-600/3-76-067, September 1976. 151 p. 58 fig., 29 tab., 206 ref. 1BA609.

Descriptors: *Chemical reactions, *Pesticides, *Herbicides, Hydrolysis, Oxidation, Reduction(Chemical), Chemical degradation, Agricultural runoff, Water quality control, Aquatic habitats, Aquatic environments.
Identifiers: *Photochemical reactions, *Photochemical transformation processes, *Malathion, *Carbaryl, *Methoxychlor, *Captan, *2,4-D esters, Photolysis, Direct photolysis, Sensitized photolysis, Photooxygenation.

Laboratory data are given to help assess the relative importance of various chemical and photochemical transformations for nine selected pesticides under conditions expected in aquatic ecosystems. Reaction processes studied include hydrolysis and oxidation-reduction among the chemical processes, and direct photolysis, sensitized photolysis and photooxygenation involving singlet oxygen among the photochemical processes. Measured rate constants, half-lives and other data are given for the transformation of malathion, carbaryl, methoxychlor, captan and 2,4-D esthers. Less-complete data are given for atrazine, diazinon, parathion and toxaphene. Transformation processes considered likely to be environmentally important in water, and calling for intensive further research, are chemical degradation for malathion, hydrolysis of 2,4-D esters in basic water and photolysis in acidic water, sensitized photolysis of methoxychlor in natural waters, sensitized photooxidation of captan in river water and hydrolysis of carbaryl in basic waters. Studies in greater detail are needed for sensitized photolysis of pollutants in natural waters, for delineation of sediment associated hydrolysis and for the role of oxidative processes in natural waters. (Harris-Wisconsin)
W77-02822

**ANALYSIS OF EMISSIONS FROM OUTBOARD TWO CYCLE MARINE ENGINES,**
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 5B.
W77-02823

**TEMPORAL VARIATIONS IN THE PHOSPHORUS CONTENT OF A NORTHERN DYSTROPHIC LAKE,**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
J. W. McMahon, and A. E. Docherty.
Report No. AECL-5103, March 1975. 14 p. 4 fig., 1 tab., 14 ref.

Descriptors: *Phosphorus, Tracers, Streams, Lakes, *Canada, *Dystrophy, Thermocline, Epilimnion, Hypolimnion, Cycling nutrients, Temperature, Input-output analysis, Entrainment, Water pollution effects.
Identifiers: *Nutrient budget, Upper Bass Lake(Ontario), Chalk River(Ontario).

Concentrations of total and soluble phosphorus (TP,SP) entering and leaving a small dystrophic lake via streams, together with its subsequent distribution in the lake, were determined using radioisotope tracer techniques. Sampling was done during the summer stagnation period when temporal variations were thought to be in a 'pseudo-steady state' condition. Results indicate that both TP and SP concentrations increased with time at all depths, with more pronounced increases in the hypolimnion. Soluble and total phosphorus increased from 8.5 and 16 ug/l in surface waters in May to 17.0 and 35.0 ug/l by September, while the bottom meter of water showed an increase from 20 and 45 ug/l in May to 85 and 112 ug/l respectively in September. Between May and August, approximately 65% of the TP and 50% of the SP input via streams was retained by the lake. Total phosphorus increases of 1.4 kg in the epilimnion compartment and 2.5 kg in the hypolimnion were reported, while net stream input was estimated at 3.1 kg. It is suggested that this 25% difference of the estimated TP budget was primarily due to precipitation input, because of the close relationship between weekly precipitation values and the concentration of phosphorus entering the lake. A process of partial phosphorus entrainment was also observed. (Luedtke-Wisconsin)
W77-02824

**TROPHIC CLASSIFICATION OF LAKES USING LANDSAT-1 (ERTS-1) MULTISPECTRAL SCANNER DATA,**
Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W77-02825

**ENVIRONMENTAL INVENTORY AND ASSESSMENT OF NAVIGATION POOLS 24, 25, 26, UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS: AN AQUATIC ANALYSIS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W77-02826

**THE CAPACITY OF SALT MARSH VEGETATION TO MODIFY THE QUALITY OF ESTUARINE WATERS,**
Rhode Island Univ., Kingston. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2L.
W77-02830

**PAPERS OF A SEMINAR ON EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES, CONFERENCE REPORT,**
Battelle Memorial Inst., Seattle, Wash.
For primary bibliographic entry see Field 5A.
W77-02835

**ENVIRONMENTAL STRESSOR MATRIX SYSTEM FOR EARLY WARNING,**
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5A.
W77-02837

**AN INCIDENT OF INDUSTRIALLY RELATED TOXIC PERIPHERAL NEUROPATHY,**
National Inst. for Occupational Safety and Health, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W77-02838

**ESTABLISHING ENVIRONMENTAL PRIORITIES FOR SYNTHETIC ORGANIC CHEMICALS: FOCUSING ON THE NEXT PCBS,**
Syracuse Univ. Research Corp., N. Y.
For primary bibliographic entry see Field 5A.
W77-02839

**REVIEW OF HEALTH/ENVIRONMENTAL SYSTEMS WITH POTENTIAL EARLY WARNING APPLICATIONS,**
Battelle-Columbus Labs., Ohio.
For primary bibliographic entry see Field 5A.
W77-02841

**A RESEARCH PROGRAM TO ACQUIRE AND ANALYZE INFORMATION ON CHEMICALS THAT IMPACT ON MAN AND HIS ENVIRONMENT,**
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W77-02842

**NATIONAL CANCER INSTITUTE PROGRAM OF CANCER SURVEILLANCE, EPIDEMIOLOGY AND END RESULTS REPORTING (SEER PROGRAM),**
National Cancer Inst., Bethesda, Md. Biometry Branch.
For primary bibliographic entry see Field 5A.
W77-02843

**A COST-RISK-BENEFIT ANALYSIS OF TOXIC SUBSTANCES,**
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02844

**THE WORLD HEALTH ORGANIZATION'S ENVIRONMENTAL HEALTH CRITERIA AND AIR MONITORING PROGRAMS,**
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5G.
W77-02845

**PUBLIC INTEREST METHODS FOR ASSESSING CHEMICAL HAZARDS,**
Center for Science in the Public Interest, Washington, D.C.
A. J. Fritsch.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p 196-201.

Descriptors: *Chemicals, *Public health, *Toxins, *Toxicity, *Social aspects, *Legal aspects, *Legislation, Water pollution effects, Industrial wastes, Air pollution, Hazards.
Identifiers: *Public interest groups, Consumer groups, Lobbyists, Community groups, Environmental groups, Public participation.

A method is described by which cooperative public interest groups may work for the detection and assessment of chemical hazards through use of an intuitive-based and nonsystematic pre-alert system which relies heavily on cooperation among various public groups, accessibility of information, credibility to the public and flexibility of approach. A public interest group with limited resources must rely on intuition to decide which potential hazards require their immediate efforts and which ones can be left to later attention. Next, samples are submitted to independent laboratories for analysis. Once the initial screening is completed, intuitive-based subjective judgement is again applied to decide on the seriousness of the suspected malady, the number of persons exposed, anticipated increases in use of the substance, types of regulation required, and alternatives which can be easily substituted without undue disruption to the national economy. If action is decided upon, the public interest group can then play the role of a lobbyist in government, the universities and the press. Examples in which prealert warning methods have been applied include: asbestos, gasoline additives and aerosol sprays. (See also W77-02835) (Harris-Wisconsin)
W77-02846

**EARLY-WARNING SYSTEM FOR TOXIC SUBSTANCES: HUMAN HEALTH ASPECTS,**
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5A.
W77-02847

**A LABORATORY MODEL ECOSYSTEM AS AN ELEMENT IN EARLY-WARNING SYSTEMS FOR TOXIC SUBSTANCES,**
Illinois Univ. at Urbana-Champaign. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5A.

W77-02848

**BACTERIAL DEGRADATION OF POLYCHLORINATED BIPHENYLS II. RATE STUDIES,**
Canada Centre for Inland Waters, Burlington (Ontario).
P. T. S. Wong, and K. L. E. Kaiser.
Bulletin of Environmental Contamination and Toxicology, Vol. 13, No. 2, p. 249-256, 1975. 3 fig., 14 ref.

Descriptors: *Microbial degradation, *Polychlorinated biphenyls, *Bacteria, Resistance, Aroclors, Laboratory tests, Pseudomonas, *Biodegradation.
Identifiers: Achromobacter, Aroclor 1221, Aroclor 1242, Aroclor 1254.

Polychlorinated biphenyls (Aroclor 1221, 1242 and 1254) at concentrations up to 0.1% in glucose did not inhibit growth of lake water bacteria; there was even a slight growth stimulation by Aroclor 1221 and 1242, as the bacteria used these compounds as sole carbon and energy sources, but not Aroclor 1254. Less than 1% of lake water bacteria, however, possess this ability. Seven bacterial isolates from Aroclor agar plates were identified; five belonged to Achromobacter sp. and two were Pseudomonas sp. The Aroclor 1221 mixture was completely degraded into several low molecular weight compounds after one month incubation. For the degradation studies of the PCB isomers three major components--biphenyl, 2-chloro-, and 4-chlorobiphenyl were condensed in separate collectors. The test results indicated that the ability of bacteria to degrade 0.05% solutions of these components were similar to the utilization of the Aroclor 1221 mixture. Not only does chlorination of the biphenyl retard the bacterial degradation, but the position of the chlorine atom in the benzene ring is a determining factor for the degradation rate of the two monochlorobiphenyls. (See also W75-02859) (Auen-Wisconsin)
W77-02851

**NYCTHEMERAL VARIATION OF THE PHYTOPLANKTON IN CAMPECHE BAY, MEXICO, (IN SPANISH),**
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Biologia.
H. Santoyo, and M. Signoret.
Rev Latinoam Microbiol 17(3), p 161-167, 1975.

Descriptors: *Variability, *Phytoplankton, *Fluctuations, Population, Dinoflagellates, *Mexico, Bays.
Identifiers: Nitzschia longissima, *Nycthemeron, Phytoflagellate, Thalassionema nitzschioides, Thalassiothrix frauenfeldii, Laguna de Terminos, *Campeche Bay(Mex).

Nycthemeral phytoplankton fluctuations were estimated in Campeche Bay near Laguna de Terminos. Qualitative and quantitative variations were registered for the levels of 0, 10, 20 and 30 m deep. Fluctuations of populations were analyzed on the species Nitzchia longissima, Thalassionema nitzschioides and Thalassiothrix frauenfeldii and naked dinoflagellate and phytoflagellate groups.--Copyright 1976, Biological Abstracts, Inc.
W77-02854

**PHYTOPLANKTON OF THE LAGUNA SALADA AND ADJACENT AREA, VERACRUX (SEPTEMBER, 1973), (IN SPANISH),**
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Biologia.
H. Santoyo, and M. Signoret.
Rev Latinoam Microbiol 17(3), p 169-173, 1975.

Descriptors: *Phytoplankton, *Environment, Environmental effects, *Mexico.
Identifiers: *Laguna, Salada(Mex), Veracruz, Taxocoenosis.

A preliminary study of phytoplankton of the Laguna Salada and adjacent area is presented. Qualitative and quantitative aspects of this taxocoenosis were registered as well as some environmental factors.--Copyright 1976, Biological Abstracts, Inc.
W77-02859

**A COMPARATIVE WATER QUALITY ANALYSIS OF SELECTED RECREATION LAKES AND STREAMS IN THE WHITE MOUNTAINS OF ARIZONA,**
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 5B.
W77-02866

**WATER QUALITY EFFECT OF DIKING A SHALLOW ARID-REGION LAKE,**
Brigham Young Univ., Provo, Utah.
D. K. Fuhriman, L. B. Merritt, J. S. Bradshaw, and J. R. Barton.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-241 984, Price codes: A11 in paper copy, A01 in microfiche. Report EPA-660/2-75-007, April, 1975. 235 p, 7 fig, 9 tab, 28 ref, 2 append. EPA Program Element 1BB045. R-801400.

Descriptors: *Dikes, *Evaporation control, *Water conservation, *Reservoir evaporation, *Computer models, Water quality, Arid lands, Lakes, Inflow, Outflow, Utah, Methodology, Salts, Water resource development, Water management(Applied), Springs, Barriers, Diversion structures, Leaching.

Natural waters of arid regions contain great quantities of dissolved minerals, mainly because the watershed soils of streams in arid areas have not been subjected to the greater precipitation and natural leaching which has occurred for centuries in humid areas. These minerals remain as residue in storage reservoirs in increasingly greater concentrations. Most of the water 'used' is taken from the waters of basins by evaporative processes (evaporation loss) and serves no immediate beneficial purpose. Studies conducted to find means of reducing evaporative loss have concentrated on application of a protective material on water surfaces. This study was concerned with reducing the surface area of Utah Lake by diking off two bays and reducing the surface area by one-third. A computer model was used to determine the changes in lake water volume and salt concentrations. The diking of Utah Lake will result in salvaging water and improving water quality. The computer simulation model developed as part of this project may be used to predict water quality improvements and quantity savings which may result from diking of lakes at any location. (Jamail-Arizona)
W77-02871

**OBSERVATIONS OF THE DAILY DYNAMICS OF PRIMARY PRODUCTION OF PHYTOPLANKTON, (IN RUSSIAN),**
Kishinev State Univ. (USSR).
V. M. Shalar', and A. A. Untura.
Gidrobiol Zh 11(3), p 46-48, 1975.

Descriptors: *Primary productivity, Productivity, *Phytoplankton, *Photosynthesis, Plankton, Bodies of water, Scenedesmus.
Identifiers: Ankistrodesmus angustus, Ankistrodesmus spp, Bottle techniques, Cyclotella spp, Scenedesmus quadricauda, Strephanodiscus spp, Kuchurgan liman, Moldavian SSR, USSR.

Observations on the daily dynamics of phytoplankton photosynthesis were carried out simultaneously with a determination of the peimary production of the Kuchurgan liman (Moldavian SSR) and certain adjacent water bodies with 24-h exposure of the bottles. The determination of primary production by the light and dark bottle technique with 24-h exposure yielded understated results, especially in water with abundant phytoplankton. Since during the day the process of photosynthesis occurs with a different intensity, for a correct determination of primary production with high phytoplankton concentrations the bottles should be exposed for 1-2h and the values obtained during 24h summed. Data are given for Cyclotella spp., Ankistrodesmus spp., Stephenodiscus spp., Scenedesmus quadricauda and A. Angustus.--Copyright 1976, Biological Abstracts, Inc.
W77-02872

**THE POTENTIAL TRACE METAL CONTAMINATION OF WATER RESOURCES THROUGH THE DISPOSAL OF FLY ASH,**
Notre Dame Univ., Ind. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-02873

**1976 ENVIRONMENTAL CONDITIONS RELATIVE TO SHRIMP PRODUCTION IN COASTAL LOUISIANA,**
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
B. B. Barrett, and E. J. Ralph.
Technical Bulletin No. 21, July 1976, 20 p, 13 fig, 4 tab, 8 ref.

Descriptors: *Environmental effects, *Temperature, *Salinity, *Rainfall, Rivers, Shrimp, Commercial shellfish, Commercial fishing, Harvesting, Estuarine environment, Estuaries, *Louisiana.

Relationships between shrimp harvest and river discharge, rainfall, salinity, water temperature and the available amount of nursery area are discussed. The environmental data is presented through April 1976 and indicates favorable condition for a good brown shrimp harvest. Water temperatures have been mild and rainfall and river discharge have been unusually low causing higher than average salinities. Salinities of 10 ppt and above have provided over 2 million acres of nursery area (the largest amount of April nursery area since 1967). (Chilton-ORNL)
W77-02876

**AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX,**
Louisiana Wildlife and Fisheries Commission, New Orleans, Div of Oysters, Water Bottoms and Seafoods.
J. W. Tarver, L. B. Savoie, and B. B. Barrett.
Technical Bulletin No. 19, January 1976, 159 p, 24 fig, 56 tab, 5 append, 55 ref.

Descriptors: *Ecology, *Limnology, Biology, Hydrology, Water chemistry, Sedimentology, Aquatic life, Wildlife, Vertebrates, Invertebrates, Plankton, Mollusks, Management, *Louisiana, Estuaries, *Estuarine environment.
Identifiers: *Lake Pontchartrain, *Lake Maurepas(La).

The purpose of the study was to investigate the composition, general distribution, and abundance of fauna inhabiting the Lake Pontchartrain-Lake Maurepas estuarine complex in order to enable administrators to efficiently manage Louisiana's renewable coastal zone resources. Included in the report are sections concerned with area description, biology, hydrology and water chemistry, and sedimentology. The biology section lists data on vertebrates and invertebrates collected in trawl and seine samples, zooplankton distribution and abundance, and mollusks collected in Peterson samples. Temperature, salinity, water chemistry, and dissolved and suspended solids are given detailed attention in the section on hydrology and water chemistry. The water bottoms of the two

lakes were found to be sediments of finer grain size than most other coastal water areas in Louisiana. This was believed to be due to the deposition of large quantities of similar sized particles by the floodwaters of 1973. (Chilton-ORNL)
W77-02879

**EMBRYONIC DEVELOPMENT, EARLY GROWTH, AND MERISTIC VARIATION IN RAINBOW TROUT (SALMO GAIRDNERI) EXPOSED TO COMBINATIONS OF LIGHT INTENSITY AND TEMPERATURE,**
Ontario Ministry of Natural Resources, Sault Ste. Marie. Fish and Wildlife Research Branch.
W. Kwain.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 3, 1975, p 397-402, 3 fig, 1 tab, 16 ref.

Descriptors: *Environmental effects, *Temperature, *Light, Fish, *Embryonic growth stage, Growth rates, *Rainbow trout, Reproduction.
Identifiers: *Meristic variations.

Optimum conditions for embryonic development of rainbow trout was found to be between 7 and 10 C and at 0.2 and 20 lx. Deviation from these conditions resulted in high mortality. Embryos were found to be tolerant of temperatures between 3 and 15 C and light intensities less than 400 lx. The study demonstrated that effect of light intensity and temperature on embryonic development is additive, and that light intensity and temperature can act singly and independently of the level of other factors. Differences in growth rates were studied at 10 and 3 C and at light intensities of 20, 2, and 0.2 lx. The higher temperatures always coincided with the higher growth rate. Fish grew slower at low light intensities than those at higher light intensities. Meristic variations were positively correlated with the embryonic development rate. (Chilton-ORNL)
W77-02881

**RECENT PROGRESS ON THE CONTROL OF OVARIAN DEVELOPMENT AND INDUCED SPAWNING OF THE GREY MULLET (MUGIL CEPHALUS L.),**
Oceanic Inst., Waimanalo, Hawaii.
C. M. Kuo, and C. E. Nash.
Aquaculture, Vol. 5, 1975, p 19-29, 5 fig, 3 tab, 13 ref.

Descriptors: *Environmental effects, *Temperature, *Light, Fish reproduction, Spawning, Photoperiodism, *Mullets.
Identifiers: *Gonadotropins, Grey mullets.

The induction of ovarian maturation out of season by manipulation of photoperiod and temperature cycle is reported. The factor of photoperiod initiated vitello-genesis of ovarian oocytes with a photoperiod of 6L/18D effectively triggering the ovarian development out of season. Best results for grey mullet occurred under constant temperature control of 21C. Fish held at a temperature range of 17-21C were induced to spawn by injections of purified salmon pituitary gonadotropin and larvae were raised through metamorphosis. (Chilton-ORNL)
W77-02882

**ROLE OF STOCK BIOMASS AND TEMPERATURE IN RECRUITMENT OF SOUTHERN GULF OF ST. LAWRENCE ATLANTIC COD, GADUS MORHUA,**
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
P. F. Lett, A. C. Kohler, and D. N. Fitzgerald.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 9, 1975, p 1613-1627, 9 fig, 67 ref.

Descriptors: *Environmental effects, *Reproduction, *Eggs, Biomass, *Gulf of St. Lawrence, Temperature, Population, *Canada.
Identifiers: Recruitment, *Atlantic cod, Gadus morhua.

The stock recruitment mechanism for Gulf of St. Lawrence cod is reported to be primarily dependent upon the population biomass with the effects of temperature being of secondary importance. Density-dependent growth and fecundity act simultaneously in providing a coarse population regulatory mechanism. The fine tuning of the system is the reliance of demersal juvenile abundance on coincident population biomass and related numbers of larvae. It was concluded that there can be no clear relationship between parent stock biomass and subsequent recruitment in a two-dimensional Cartesian system. (Chilton-ORNL)
W77-02883

**BARATARIA BASIN: SALINITY CHANGES AND OYSTER DISTRIBUTION,**
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
V. R. Van Sickle, B. B. Barrett, L. J. Gulick, and T. B. Ford.
WLFC Technical Bulletin No. 20, Sea Grant Publication No. LSU-T-76-002, May, 1976. 22 p, 8 fig, 3 tab, 58 ref, append.

Descriptors: *Environmental effects, *Salinity, *Oysters, Commercial shellfish, Shellfish farming, Temperature, Water pollution, Population, Productivity, *Louisiana, Distribution.
Identifiers: *Barataria Basin(La).

Environmental factors affecting oyster population and the history of oyster production in the Barataria Basin, are discussed. Data shows that distribution of oysters is directly related to salinity and that mortalities resulting from predation and disease are often associated with increased levels of both salinity and temperature. Comparison of data accumulated over the past 20 years shows a trend towards increased levels of salinity in the Barataria estuary with a resulting northward movement of oyster producing areas. Problems arising from encroaching pollution levels from the north pose a real threat to oyster production in the Barataria Basin. (Chilton-ORNL)
W77-02884

**EFFECTS OF TREE GROWTH NEAR SMALL WATERWAYS OF MUENSTER ON VEGETATION IN WATER AND ON SLOPES WITH RESPECT TO MAINTENANCE OF THOSE WATERWAYS, (IN GERMAN),**
Bundesanstalt fuer Vegetationskunde, Naturschutz und Landschaftspflege, Bonn-Bad Godesberg (West Germany).
For primary bibliographic entry see Field 4A.
W77-02887

**EFFECT OF SOME INTEGRAL COMPONENTS OF DETERGENTS ON THE BEHAVIOUR, MORTALITY AND DAMAGE OF GILLS OF THE LARVAE OF THE SPECIES RHYACOPHILA FASCIATA HAG. (TRICHOPTERA), (IN SERBO-CROATIAN),**
Zagreb Univ. (Yugoslavia). Inst. of Zoology.
I. Habdija.
Glas Repub Zavoda Zast Prir Prir Muz Titogradu 8, p 51-59, 1975.

Descriptors: *Detergents, Larvae, Water pollution effects, Toxicity, Mortality, Sodium compounds, Organic compounds.
Identifiers: *Rhyacophila-fasciata, *Yugoslavia, Tetrapropylene benzosulfonate, Sodium metasilicate, Trichoptera.

The branchial damage caused by concentrations of 10, 25 and 50 mg/l of tetrapropylene benzol-sulfonate and sodium metasilicate and their toxic effects on the behavior and mortality of R. fascita larvae were studied. Abnormal behavior under laboratory conditions resulted from all concentrations of tetrapropylene benzolsulfonate but mortality and branchial damage after 5 days were proportional to the concentration. Sodium metasilicate produced no toxic effects. (These studies are relevant to detergent pollution of natural waters in Yugoslavia.)--Copyright 1976, Biological Abstracts, Inc.
W77-02893

**KRAFT MILL WASTES AND THEIR TOXICITY FOR AQUATIC ORGANISMS, (IN RUSSIAN),**
Biologo-Geograficheskii Nauchno-Issledovatelskii Institut, Irkutsk (USSR).
Ya. M. Grushko, O. M. Kozhova, and D. I. Stom.
Gidrobiol Zh 11(5), p 118-125, 1975.

Descriptors: Toxicity, Pulp wastes, Industrial wastes, Water pollution effects, Fish, Daphnia, Odor, Lethal limit, Phenols, Carp, Perch, Trout, Salmon, Aquatic animals.

Data from a review of the literature is presented on the effect of various toxic substances contained in kraft mill wastes on aquatic organisms (fish (minnow, guppy, carp, perch, roach, trout, rainbow trout, salmon) and Daphnia) and concentrations of phenolic compounds in waste liquors that are lethal, toxic or impart an unpleasant odor and taste to fish.--Copyright 1976, Biological Abstracts, Inc.
W77-02894

**EXPERIMENTAL, CLINICAL AND PHYSIOLOGICAL DATA FOR SUBSTANTIATING THE LOWER LIMITS OF THE MINERALIZATION OF DESALINATED DRINKING WATER, (IN RUSSIAN),**
Moskovskii Gosudarstvennyi Meditsinskii Institut (I).(USSR). Dept. of Public Hygiene.
Yu. A. Rakhmanin, A. I. Bokina, V. P. Plugin, T. A. Grishelevich, and R. I. Mikhaliova.
Gig Sanit 7, p 16-22, 1975.

Descriptors: *Potable water, Mineralogy, *Desalination, *Public health, Lethal limit, *Metabolism, Water quality standards, Water pollution, Saline water.

Distillate and weakly mineralized waters cause changes in water-salt metabolism (humans and dogs) and in the related homeostasis indices and therefore cannot be used for drinking purposes. The lower limit of mineralization of desalinated water should be 100 mg/l; the lower limit of the optimal total content of salts should be 200 mg/l. This applies mainly to the desalinated drinking water of the sodium-chloride-sulfate type.--Copyright 1976, Biological Abstracts, Inc.
W77-02895

**STUDY ABOUT THE TOXIC ACTION OF ZINC ON ONE SUMMER OLD CARP: I. LETHAL CONCENTRATIONS, (IN BULGARIAN),**
Sofia Univ. (Bulgaria). Faculty of Biology; and Sofia Univ. (Bulgaria). Dept. of Zoology.
V. Tishinova.
God Sofii Univ Biol Fak 67(1), p 107-110, 1972/73 (1975).

Descriptors: *Carp, Fish, *Toxicity, Water pollution effects, *Lethal limit, *Zinc, Summer.

A 1-summer-old-carp, weight 30 g, length 10-12 cm was investigated. The toxic concentrations of Zn2+(ZnSO4) for 96 h were established. The water used had pH 6.5, temperature 17-18C, total hardness 1.5 and dissolved oxygen 3-4 mg/l. The data of the experiments were calculated by the Litchfield and Wilcoxon method. The 24 and 96 h LC50's(mg/l) were 36.4 (32.07-42.31) and 21.4 (16.85-27.18), respectively; the LC10's were 26.6

(23.44-30.19) and 12.8 (9.55-17.15); the LC90's were 50.3 (44.32-57.09) and 36.2 (27.01-48.87). The 1-summer-old carp bears higher concentrations of Zn in comparison with other fish.--Copyright 1976, Biological Abstracts, Inc.
W77-02896

**SELECTION OF STRAINS IN INVESTIGATIONS FOR HYGIENIC STANDARDIZATION OF THE BACTERIAL COMPOSITION OF DRINKING WATER, (IN RUSSIAN),**
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
M. S. Belakovskii.
Gig Sanit 12, p 72-75, 1975.

Descriptors: *Potable water, *Bioindicators, Bacteria, Public health, *Water quality standards, E coli, *Salmonella, Mortality, Chlorine, Microorganisms, Water pollution effects.
Identifiers: Salmonella-paratyphi, Salmonella-typhimurium.

The differences in the survival and Cl resistance of strains of microorganisms (Escherichia coli, Salmonella paratyphi B, S. typhimurium) from a standard culture collection and of microorganisms isolated from environmental objects (wild strains) are insignificant; both can be used in bacteriological experiments. In experiments for hygienic standardization of drinking water quality the standard strains should be used, since they yield comparable results in experiments conducted by different investigators, which is impossible with strains isolated from various environmental objects.--Copyright 1976, Biological Abstracts, Inc.
W77-02900

**IDENTIFICATION OF ACID-CONTAINING FRACTION OF ODORANTS OF NATURAL WATER, (IN RUSSIAN),**
Akademiya Nauk URSR, Kiev. Inst. of Colloidal Chemistry and Water.
For primary bibliographic entry see Field 5A.
W77-02901

**YEASTS AND FUNGI IN MARINE ENVIRONMENTS, (IN FRENCH),**
Centre Hospitalo-Universitaire-Poitiers (France). Lab. of Bacteriology.
For primary bibliographic entry see Field 5B.
W77-02904

**STUDY OF SANITARY PROBLEMS IN CONNECTION WITH INTER-BASIN TRANSFER OF RIVER RUNOFF, (IN RUSSIAN),**
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
L. S. Gurvich, Yu. V. Novikov, and M. M. Saifutdinov.
Gig Sanit 12, p 62-65, 1975.

Descriptors: Public health, *Inter-basin transfers, Rivers, Runoff, *Water pollution effects, *Diversion, Withdrawal, Engineering structures, *Water quality control.

The diversion of large volumes of water from one basin to another located in a different geographic zone changes the hydrology and water quality. Hydraulic engineering structures built for water withdrawal and diversion change the sanitary conditions. Investigation and prevention of adverse sanitary consequences are discussed.--Copyright 1976, Biological Abstracts, Inc.
W77-02905

**EFFECT OF HEAT-EXCHANGE WATERS OF A STATE REGIONAL ELECTRIC POWER PLANT ON CONDITIONS OF WATER USE BY THE POPULATION, (IN RUSSIAN),**
Kemerovo State Medical Inst. (USSR).
For primary bibliographic entry see Field 5G.
W77-02906

**EXPERIMENTAL SUBSTANTIATION OF THE MAXIMUM ALLOWABLE CONCENTRATION OF DIMIDE IN WATER BODIES, (IN RUSSIAN),**
Academy of Medicine, Sofia (Bulgaria). Center for Hygiene.
S. Novakova, and S. Dinoeva.
Gig Sanit 12, p 75-78, 1975.

Descriptors: *Herbicides, *Organoleptic properties, Odor, Taste, Biochemical oxygen demand, Toxicity, *Lethal limit, Water quality standards, Rodents.
Identifiers: *Dimide, Diphenamid.

The herbicide dimide (diphenamid) affects the organoleptic properties (odor and taste) of water. Its threshold concentration with respect to taste is 6 mg/l and with respect to odor 8 mg/l. Dimide in a concentration up to 48 mg/l does not inhibit biochemical O2 demand processes. A dimide concentration of 4 mg/kg (80 mg/l) was inactive for warm-blood animals (rats) under conditions of a chronic sanitary-toxicological experiment. A concentration of dimide of 6 mg/l is proposed as the maximum allowable in water bodies.--Copyright 1976, Biological Abstracts, Inc.
W77-02907

**THE GENERAL CHARACTER OF THE WATER OF THE MIDDLE OF THE SAALE RIVER, (IN GERMAN),**
For primary bibliographic entry see Field 5B.
W77-02910

**THE BIOMASS AND PRODUCTION OF THE MACROBENTHOS OF THE MIDDLE COURSE OF THE SAALE RIVER, (IN GERMAN),**
D. Floessner.
Limnologica 10(1), p 123-153, 1976.

Descriptors: *Biomass, *Benthos, *Productivity, *Diptera, Water pollution, Rivers.
Identifiers: Ancylus-fluviatilis, Asellus-aquaticus, Asellus-coxalis, Gammarus-pulex, Herpobdella-octoculata, Hydropsyche-angustipennis, Hydropsyche-sp, Rhyacophila-nubila, *Saale River(E. Germany).

Quantitative studies on the macrobenthos of the Saale River at 6 localities between Eichicht and Grossheringen (East Germany) made from Feb.-Oct. 1971 and from March-Aug. 1972. Chironomidae predominated everywhere and Gammarus pulex was abundant between Eichicht and Fischersdorf; Herpodella octoculata, Asellus and Hydropsyche angustipennis were dominant in the lower, more polluted sections. Rheophilic insects were commonly only at Fischersdorf. Pollution with sewage reduced the number of species. The biomass was lowest in late winter and early spring and highest in mid-summer. The important productive species were G. pulex at Eichicht, G. pulex, Rhyacophila nubila and Hydropsyche sp. at Fischersdorf and H. octoculata, Asellus aquaticus, A. coxalis and H. angustipennis from Rotherstein to Grossherigen. Ancylus fluviatilis was also important at Maua.--Copyright 1976, Biological Abstracts, Inc.
W77-02912

**THE GROUNDWATER FAUNA OF THE SAALE RIVER DRAINAGE AREA (THURINGIA), (IN GERMAN),**
Zentralinstitut fuer Mikrobiologie und Experimentelle Therapie, Jena (East Germany).
D. Ronneberger.
Limnologica 9(3), p 323-419, 1975.

Descriptors: Rivers, Surveys, *Drainage basins, Aquatic animals, *Distribution, Data collections, Europe, Water pollution effects, Groundwater, Diptera, Ecology.
Identifiers: Acarina, Amphipoda, Aranea, Archiannelida, Candona-Eremita, Candonna-Hertzogi, Chilopoda, Cladocera, Coleoptera, Cyclopoida, Diplopoda, Gastropoda, Harpacticoida, Hydrozoa, Hymenoptera, Isopoda, Nematoda, Oligochaeta, Ostracoda, Pelecypoda, Pleistocene, Pseudoscorpiones, Rotatoria, Syncarida, Thuringia, Thysanoptera, Turbellaria, *Saale River(E. Germany).

A survey of the groundwater fauna of the Saale river drainage of Thuringia, East Germany yielded 2 spp. of Hydrozoa, 5 spp. of Turbellaria, 4 spp. of Rotatoria, 32 spp. of Nematoda, 1 sp. of Archiannelida, 2 spp. of Oligochaeta, 2 spp. of Cladocera, 12 spp. of Ostracoda, 14 spp. of Cyclopoida, 20 spp. of Harpacticoida, 2 spp. of Syncarida, 6 spp. of Amphipoda, 2 spp. of Isopoda, 15 spp. of Acarina, 1 sp. Pelecypoda, 3 spp. of Gastropoda, 1 sp. of Chilopoda, 2 spp. of Diplopoda, 1 sp. of Thysanoptera, 6 spp. of Coleoptera, 3 spp. of Hymenoptera, 1 sp. of Diptera, 1 sp. of Pseudoscorpiones and 5 spp. of Araneae. Candona eremita and C. hertzogi are new for East and West Germany. Localities, distributional data, bibliographic citations and accompanying species are given. Geological, geographical and hydrological data are included for the Orla, Schwarza and Roda river areas studied and the important stygophilic, stygobiontic and stygoxenic species are geographically and geographically discussed. The sections of the stream could not be clearly distinguished on the basis of ecological characteristics. The age and origin of the recent subterranean fauna are discussed. Terminology is proposed for a fragmented ecosystem (dialeimmal). The present distribution of the stygobiontic species is explained with reference to the Pleistocene river systems of Europe and the effects of the ice age. Possibilities for evaluating aquatic fauna by analyzing the subterranean organisms are also discussed. It is also possible to evaluate the effects and severity of pollution on the basis of the stygobiontic, stygophilic and stygoxenic species found.--Copyright 1976, Biological Abstracts, Inc.
W77-02913

**DISTRIBUTION OF AMPHIPODA IN THE DNIESTER ESTUARY AND ITS POSSIBLE CHANGES IN CONNECTION WITH THE REGULATION OF THE DNIESTER RIVER, (IN RUSSIAN),**
Institute of Biology of the Southern Seas, Sevastopol (USSR).
I. I. Greze, A. G. Krastskaya, and Z. A. Ponomareva.
Zool Zh 54(11), p 1723-1726, 1975.

Descriptors: Biomass, *Distribution, Estuaries, Salinity, Regulation, Seasonal, Water pollution, Rivers.
Identifiers: *Amphipods, Biomass, Corophiidae, *Dniester estuary(USSR), Gammaridae, Gmelina-kusnetzowi, USSR.

Amphipods in the Dniester estuary (USSR) are represented by Gammaridae (23 spp.) and Corophiidae (7 spp.). Gmelina kusnetzowi (Sow.) is recorded for the 1st time in the estuary. The occurrence of gammarids in different regions of the estuary characterized by different salinity changes from 17-51% and that of corophiids from 40-90%. In the norther and middle regions where the salinity changes only slightly and does not exceed 3.4%, the Caspian amphipods predominate. Seasonal dynamics is characterized by increased population density and biomass during spring-summer and a decrease during autumn-winter. Salinization of the estuarine waters due to the hydroconstruction may result in changes in composition and distribution of amphipods.--Copyright 1976, Biological Abstracts, Inc.
W77-02914

**STUDY OF PERIPHYTON PRODUCTIVITY IN THE NOVOSIBIRSK RESERVOIR, (IN RUSSIAN),**
Akademiya Nauk SSSR, Novosibirsk. Central Siberian Botanical Garden.

G. D. Levadnaya.
Izv Sib Otd Akad Nauk Sssr Ser Biol Nauk 3, p 32-38, 1975.

Descriptors: *Periphyton, *Productivity, Reservoirs, *Photosynthesis, Algae, *Biomass.
Identifiers: *Novosibirsk Reservoir(USSR), USSR.

A study of periphyton productivity was made using the glass slide method in 1962 (in the USSR). The production rate high in July; biomass was 1580 mg/10 cm2. Photosynthetic activity of periphyton algae (6.2 mg O2/10 cm2) reached a maximum in June. The coefficient PB/(production/biomass) was 0.12. Turnover was 8.5 days.--Copyright 1976, Biological Abstracts, Inc.
W77-02915

**PRIMARY PRODUCTION AND OXYGEN BUDGET IN A STREAM OF THE CENTRAL PYRENEES, (IN FRENCH),**
Toulouse-3 Univ. (France). Laboratoire d'Hydrobiology.
J. Capblancq, and P. Lavandier.
Ann Limnol 11(2), p 189-201, 1975.

Descriptors: *Primary productivity, *Dissolved oxygen, *Organic matter, Metabolism, Streams, Degradation(Decomposition), Decomposing organic matter, Water pollution, Shrubs, Ecosystems.
Identifiers: *France(Pyrenees streams).

Comparisons of changes in the dissolved O2 concentration between upstream and downstream stations was used to estimate primary production in a small stream at a mean altitude in the Pyrenees (France). Decomposition processes greatly exceeded gross primary production. The reduction in illumination by the shrubs on the bank, the large input of organic material at the time of the autumnal fall of leaves, and the progressive silting coupled with the absence of floods appeared to be the chief factors responsible for the metabolism of this ecosystem. In spite of some limiting factors (low variations is dissolved O2, strong diffusion, short retention time, input through drainage), the upstream-downstream comparative method can provide some valid estimates of production. The principal causes of error are analyzed.--Copyright 1976, Biological Abstracts, Inc.
W77-02916

**ON THE LIVING ENVIRONMENT FOR FISH IN THE COASTAL WATERS SURROUNDING THE NEW AND OLD VOLCANIC ISLAND 'NISI-NO-SIMA', (IN JAPANESE),**
Tokyo Univ. of Fisheries (Japan). Lab. of Research and Training Vessel Shinyo-maru.
T. Kido.
J Tokyo Univ Fish 61(1/2), p 59-63, 1975.

Descriptors: Surveys, *Water pollution effects, Coasts, Islands, *Fish, *Fish habitats, Environment, Asia.
Identifiers: *Japan, Nisi-No-Sima, *Volcanic ash.

In March, 1974 observations were carried out as a part of the survey of the volcanic island 'Nisi-no-Sima' to determine the effect of the eruption of a new volcano 'Nisi-no-Sima-Sin To' on fish in the coastal waters of the islands (Japan). Numerous fishes were caught by angling in the water off the W coast of the old island where the clean ocean water lapped the shore directly. Very few were caught on the E coast of the new island where the water contained volcanic materials ejected from the new volcano. The habitat for fish in the coastal region has been destroyed directly as well as indirectly by the eruption of the new volcano, though the damaged area may be small.--Copyright 1976, Biological Abstracts, Inc.
W77-02917

**A RECONNAISSANCE OF THE EFFECTS OF A FOREST FIRE ON WATER QUALITY IN KINGS CANYON NATIONAL PARK, CALIFORNIA,**
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02973

**LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION; APPLICATION OF THREE-DIMENSIONAL HYDRODYNAMIC MODEL TO STUDY EFFECTS OF PROPOSED JETPORT ISLAND ON THERMOCLINE STRUCTURE IN LAKE ERIE,**
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Earth Sciences.
For primary bibliographic entry see Field 2H.
W77-02994

**THE EFFECT OF RIVER FLUCTUATIONS RESULTING FROM HYDROELECTRIC PEAKING ON SELECTED AQUATIC INVERTEBRATES AND FISH,**
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 5G.
W77-03000

**STANDARD TEST FISH DEVELOPMENT. PART I. FAT-HEAD MINNOWS (PIMEPHALES PROMELAS) AND GOLDFISH (CARASSIUS AURATUS) AS STANDARD FISH IN BIOASSAYS AND THEIR REACTION TO POTENTIAL REFERENCE TOXICANTS,**
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
For primary bibliographic entry see Field 5A.
W77-03002

**STANDARD TEST FISH DEVELOPMENT. PART II: CHRONIC TOXICITY OF GUTHION TO THE FATHEAD MINNOW (PIMEPHALES PROMELAS REFINESQUE),**
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
For primary bibliographic entry see Field 5A.
W77-03003

**TEMPERATURE EFFECTS OF CRUDE OIL IN THE UPPER INTERTIDAL ZONE,**
University of Southern California, Los Angeles. Allan Hancock Foundation.
D. Straughan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 956, Price codes: A04 in paper copy, A01 in microfiche. Environmental Protection Agency, Environmental Protection Technology Series, Report EPA 600/2-76-127, July, 1976. 53 p. 10 fig, 17 tab, 12 ref.

Descriptors: *Water pollution effects, *Crustaceans, *Oil spill, *Intertidal areas, Littoral, *Temperature, *California, *Marine animals, Benthic fauna, Benthic flora, Mollusks, Laboratory investigation, *On-site observations.
Identifiers: Southern California. *Santa Barbara, *Santa Barbara Crude oil, *Barnacles, *Chthamalus fissus, *Barnacle larvae, *Black body effect.

Experiments were conducted in the field and laboratory in Southern California to determine the effects of heavy black asphaltic Santa Barbara crude oil on the intertidal barnacle Chthamalus fissus. Observations were also made on surfaces in the Santa Barbara Channel oiled following the 1969 Santa Barbara oil spill. The data presented support the original hypothesis that this type of oil acts as a black body. It is this 'black body' effect which has a long term influence on Chthamalus fissus distribution after the oil has developed a hard surface crust. This is based on the following observations: (1) larvae can settle, survive, and grow on the dry oil (tar) (2) larvae prefer a black surface to a light surface (3) temperature stresses are greater on a black surface than on a light surface. (Katz)
W77-03004

**BIOTRANSFORMATION AND CHEMICAL FORM OF MERCURY IN PLANTS,**
Environmental Montoring and Support Lab., Las Vegas, Nev.
D. D. Gay.
Ecological Research Series, Report EPA-600/3-76-082, July 1976, 9 p, 3 fig, 29 ref.

Descriptors: *Mercury, *Plant physiology, *Plant tissues, *Metals, *Water pollution effects, Biochemistry, Absorption, *Environmental effects, Trace elements, *Legumes, *Public health, Enzymes.
Identifiers: *Plant biochemistry, *Methylmercury, *Mercurial transformation, Biotransformation, *Phenylmercury, *Pisum sativum, Peas.

The in vitro methylation of inorganic mercury has been demonstrated using an acetone precipitated protein fraction from Pisum sativum and S-adenosylmethionine as the methyl-donating compound. A time course of the enzymatic formation of methylmercury has shown that the maximum methylmercury concentration occurred after 1 hour of incubation of the substrates with the enzyme system. At all subsequent incubation times reduced concentrations of methylmercury in the reaction mixture were observed. When a time course for the in vivo methylation of inorganic mercury was done using an infiltration and incubation procedure, the maximum concentration of methylmercury was observed after 10 hours of incubation. All subsequent incubation periods produced lesser amounts of methylmercury. The results suggest that the methylmercury is an intermediate compound in the mercury pathway in peas (Pisum sativum). (Katz)
W77-03006

**IMPACTS OF CONSTRUCTION ACTIVITIES IN WETLANDS OF THE UNITED STATES,**
Tereco Corp., College Station, Tex.
R. M. Darnell, W. E. Pequegnat, B. M. James, F. J. Benson, and R. A. Defenbaugh.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 674, Price codes: A19 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecological Research Series, Report EPA 600/3-76-045, April 1976. 392 p, 7 tab, 6 fig, 1023 ref.

Descriptors: *Wetlands, *Marshes, *Freshwater marshes, *Coastal marshes, *Tidal marshes, *Swamps, Aquatic environment, *Aquatic habitats, *Land reclamation, Soils, *Soil-water-plant relationships, *Wildlife, Aquatic plants, Aquatic animals, Streams, Estuaries, Continental shelf, Bibliographies, Reviews, Water quality, *Construction.

The primary types of construction activity which severely impact wetland environments of the United States include: floodplain surfacing and drainage, mining, impoundment, canalization, dredging and channelization, and bank and shoreline protection. Each type of construction activity is attended by an identifiable suite of physical and chemical alterations of the wetland environment which may extend for many miles from the site of construction and may persist for many years. In turn, each type of physical and chemical modification has been shown to induce a derived set of biological effects, many of which are predictable, in general, if not in specific detail. The most environmentally damaging effects of construction activities in wetland areas, in order of importance, are: direct habitat loss, addition of suspended solids and modification of water levels and flow regimes. Major construction-related im-

pacts also derive from altered water temperature, pH, nutrient levels, oxygen, carbon dioxide, hydrogen sulfide, and certain pollutants such as heavy metals, radioactive isotopes, and pesticides. (Katz)
W77-03007

**CADMIUM IN AN AQUATIC ECOSYSTEM: DISTRIBUTION AND EFFECTS,**
New York Univ. Medical Center, N. Y. Inst. of Environmental Medicine.
For primary bibliographic entry see Field 5B.
W77-03009

**THE BIOLOGY AND CHEMISTRY OF A WARM-WATER STREAM,**
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
M. L. Brehmer, R. C. Ball, and N. R. Kevern.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 112, Price codes: A04 in paper copy, A01 in microfiche. Institute of Water Research, Michigan State University, Technical Report No. MSU-IWR-TR-68-003, Red Cedar River Series, December 1968. 50 p, 8 tab, 3 fig, 23 ref.

Descriptors: *Michigan, *Water pollution sources, *Streams, *Urban drainage, Drainage area, Surface waters, Sediments, *Sewage, Sewage disposal, Urbanization, Erosion, *Ammonia, Ammonium compounds, Aquatic animals, Aquatic insects, *Benthic fauna, *Dissolved oxygen, Water pollution effects, Nutrients.
Identifiers: *Red Cedar River(Mich), Lansing(Mich).

The Red Cedar River, once a productive smallmouth bass stream, is located within the recreational area of metropolitan Lansing. The aesthetic and recreational value of this stream has been reduced as the result of urbanization and increased agricultural use, with the resulting fast runoff, erosion, and siltation, and by the introduction of domestic and industrial pollution. This study is concerned with the effects of nutrient inputs on the ecology of the stream and presents data vital to the reclamation processes. Specific emphasis is given to the ammonia nitrogen content and the dissolved oxygen content of the water, and the families of benthic forms present in the stream. Early observations seem to indicate that stream fertilization resulting from nutrient input released by the decomposition and mineralization of the organic material in the domestic sewage increased the complexity of the standing crop of the area. (Katz)
W77-03010

**THE DISTRIBUTION AND ABUNDANCE OF LARVAL FISHES ALONG THE WESTERN SHORE OF LAKE ERIE AT MONROE, MICHIGAN,**
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 2H.
W77-03011

**RESULTS FROM AQUATIC ECOLOGICAL SURVEYS AT NEWPORT ARMY AMMUNITION PLANT, NEWPORT, INDIANA,**
Edgewood Arsenal, Aberdeen Proving Ground, Md.
E. S. Bender, and J. G. Pearson.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-016 897, Price codes: A03 in paper copy, A01 in microfiche. Technical Report, EB-TR-75044, October, 1975. 39 p, 12 tab, 4 fig, 17 ref.

Descriptors: *Methodology, *Benthos, *Water quality, *Invertebrates, Aquatic animals, Aquatic environment, Industrial wastes, Streams, Productivity, Degradation(Stream), Flow rates, Water pollution treatment, *Water pollution effects, Natural streams, Sewage sludge, Water pollution sources, On-site-investigations, *Indiana.
Identifiers: Monitoring, *Aquatic ecological survey, Wabash River(Ind), Munitions manufacturing, *Munitions wastes, *Trinitrotoluene(TNT).

Aquatic ecological surveys were conducted at Newport Army Ammunition Plant (NAAP) from February through June 1973 to determine the effects of TNT manufacturing and other plant operations on the water quality and stream biota of the drainages surrounding NAAP. Macroinvertebrates and stream water quality were sampled monthly, and fishes quarterly. Fishes collected were typical for streams in the area. Diversity and abundance of macroinvertebrates were affected more by natural fluctuations in the flow and runoff than by discharges or accidental spill from the TNT facility. Little Vermillion Creek received TNT wastes several times during the study, from accidental spills; however, no effect on species diversity or occurrence was detected. Little Raccoon Creek was biologically degraded by remnant sewage sludges and boiler blowdown; however, it had significantly recovered before it left the plant area. The discharge from the TNT plant entered the Wabash River after combining with the domestic sewage discharge. It was distinquishable from the river water by its color and high sulfate and conductivity values. There was insufficient biological data from the Wabash River to determine any effects from the TNT discharge. (Katz)
W77-03015

**TOXAPHENE EFFECTS ON REPRODUCTION, GROWTH, AND MORTALITY OF BROOK TROUT,**
Fish and Wildlife Service, Columbia, Mo. Fish-Pesticide Research Lab.
F. L. Mayer, Jr., P. M. Mehrle, Jr., and W. P. Dwyer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 303, Price codes: A04 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecologic Research Series, Report EPA 600/3-75-013, November 1975. 42 p., 15 tab., 2 fig., 69 ref.

Descriptors: *Brook trout, *Toxicity, Laboratory analysis, *Insecticide, *Chlorinated hydrocarbon pesticides, Pesticides, *Water pollution effects, Water pollution sources, *Growth rate, Environmental effects, *Mortality, *Bioassay, *Laboratory animals, Pathology, Fish fry, *Salmonids, *Reproduction.
Identifiers: *Toxaphene, *Continuous flow bioassay, Flow-through dilution system, *Collagens, *Chronic effects, Residue dynamics.

Yearling brook trout (Salvelinus fontinalis) were continuously exposed to toxaphene (0, 39, 68, 139, 288 and 502 ng/l) in a flow-through diluter system. Day length and water temperature were altered monthly to correspond to natural conditions. Adult growth was reduced in the 288 and 502 ng/l toxaphene exposures, and the added stress of spawning activities caused extensive mortalities in these concentrations. The numbers of eggs spawned and percent viability were inversely related to increasing toxaphene concentrations. All groups of fry exposed to toxaphene had reduced rates of growth and survival. Biochemical investigations on fry backbones demonstrated that bone collagen may be a sensitive indicator of normal and abnormal growth and development prior to being observed in the whole fish. Toxaphene was accumulated by brook trout 5,000 to 76,000 times that in the water and the more chlorinated isomers of toxaphene were preferentially stored. (Katz)
W77-03017

**METHYL MERCURY AND THE METABOLIC RESPONSES OF BRAIN TISSUE,**
Health Effects Research Lab., Cincinnati, Ohio.
R. J. Bull.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-252 006, Price codes: A03 in paper copy, A01 in microfiche. Environmental Health Effects Research Series, Report EPA 600/1-76-013, March 1976, 23 p., 7 fig., 30 ref.

Descriptors: *Mercury, *Public health, *Water pollution effects, Biochemistry(Animal), *Animal pathology, *Animal physiology, *Toxicity, Growth rates, *Metabolism, Potable water, Laboratory observations.
Identifiers: *Mercury organic compounds, *Methyl mercury, Cerebral cortex, *Brain energy metabolism.

Weanling, Sprague-Dawley rats have been exposed to methyl mercuric chloride (concentrations from 0.01 to 10.0 mg/liter) in their drinking water. At 10 mg/liter the animals exhibited neurological symptoms typical of methyl mercury. Also, in this group a considerable decrease in growth occurred which was associated with a decreased consumption of food. Responses of the respiratory intermediates to stimulation were found to be altered in cerebral cortex slices taken from exposed animals. Effects on tissue pyridine nucleotides predominated. An enhancement of the rats of pyridine nucleotide reduction by electrical stimulation was observed at 0.1 mg/liter. This rate progressively decreased at higher dose levels. Reoxidation of reduced pyridine nucleotide was also inhibited at 0.1 mg/liter at both 90 and 180 days of exposure. Potassium stimulated aerobic glycolysis was found to be enhanced in its initial stages at 0.10 mg/liter of methyl mercuric chloride in the drinking water but progressively declined at 1.0 and 10 mg/liter. A close parallel was observed between the time constant of pyridine nucleotide oxidation following electrical stimulation and the 'responsiveness' of the aerobic glycolytic rate to stimulation by potassium. These results suggest an initial defect in the oxidation of cytoplasmic NADH which progresses to loss of metabolic control of cytoplasmic oxidations. (Katz)
W77-03018

**RESPONSE OF TWO ARCTIC AMPHIPODS, GAMMARUS ZADDACHI AND BOECKOSIMUS (ONISIMUS) AFFINIS TO VARIATIONS IN TEMPERATURE AND SALINITY,**
Louisville Univ., Ky. Dept. of Biology.
M. Busdosh, and R. M. Atlas.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2564-2568, 1975, 3 tab., 2 fig., 15 ref.

Descriptors: *Temperature, *Salinity, *Amphipoda, *Arctic, *Resistance, *Respiration, *Animal physiology, *Environmental effects, *Mortality, Laboratory tests, Crustaceans, Invertebrates, Cold regions.
Identifiers: *Gammarus zaddachi, *Boeckosimus(Onisimus) affinis.

Two arctic amphipod were found to be capable of tolerating a wide range of temperatures and salinities. They were tolerant to both abrupt changes, as would occur in crossing a thermocline, and to gradual changes, as would occur seasonally. Gammarus zaddachi could survive lower salinities and higher temperatures than Boeckosimus (Onisimus) affinis. Salinity had a statistically significant effect on rates of respiration rate in response to temperature changes. The ecological distribution of these amphipods appears to be in part determined by their ability to tolerate fluctuations in salinity and temperature. (Katz)
W77-03019

**PRODUCTION BY BROOK TROUT (SALVELINUS FONTINALIS) IN FOUR STREAMS IN THE MATAMEK WATERSHED, QUEBEC,**
Waterloo Univ. (Ontario). Dept. of Biology.
J. F. O'Connor, and G. Power.

Journal of the Fisheries Research Board of Canada, Vol. 33, No. 1, p. 6-18, January, 1976. 2 fig., 10 tab., 24 ref.

Descriptors: *Limiting factors, *Fish populations, *Food webs, *Productivity, *Brook trout, *Environmental effects, *Trout, *Stream fisheries, *Benthos, *Aquatic habitats, Salmonids, Biomass, Growth rates, Population, Streams, Biological communities, Fish diets, *Canada.
Identifiers: *Canadian shield, *Matamek River(Quebec).

Production by brook trout (Salvelinus fontinalis) in four infertile streams on the Canadian Precambrian Shield was estimated to be between 14.5 and 66.4 kg/ha per yr during 3 successive yr of study (1971-73). These values represent the range of total fish flesh elaborated annually in these streams because trout was the only species present. Differences between streams in annual production and P:B ratios arose from variations in stream cover (and its effect on carrying capacity), recruitment, and total biomass. Variations in age-specific growth rates were not critical. Production in the two most productive streams was judged to be controlled by food, while in the other two streams lack of suitable cover for adult trout limited production. (Katz)
W77-03020

**ZINC UPTAKE BY ATLANTIC SALMON (SALMO SALAR) EXPOSED TO A LETHAL CONCENTRATION OF ZINC AT 3, 11 AND 19 C,**
Guelph Univ. (Ontario). Dept. of Zoology.
P. V. Hodson.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2552-2556, 1975, 1 tab., 1 fig., 24 ref.

Descriptors: *Zinc, *Tracers, *Absorption, *Radioisotopes, *Temperature, *Salmon, *Zinc radioisotopes, *Atlantic salmon, *Bioassay, *Toxicants, Laboratory tests, Analytical techniques, Metals, Inhibition, Mode of action.
Identifiers: *Bioaccumulation, Gills.

Atlantic salmon (Salmo salar) acclimated to 3, 11 and 19 C took up high concentrations of zinc in gill tissues during exposures to a nominal 14 mg/liter of zinc The rate of zinc uptake, as shown by isotopic zinc tracer, increased from a minimum of 3 C to a maximum of 19 C. In fish killed by zinc exposure, zinc concentrations in gills were highest at 19 C and lowest at 3 and 11 C. (Katz)
W77-03021

**PURGING A MUDDY-EARTHY FLAVOR TAINT FROM RAINBOW TROUT (SALMO GAIRDNERI) BY TRANSFERRING TO ARTIFICIAL AND NATURAL HOLDING ENVIRONMENTS,**
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5G.
W77-03023

**TEMPERATURE TOLERANCE OF YOUNG-OF-THE-YEAR LAKE WHITEFISH, COREGONUS CLUPEAFORMIS,**
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
T. A. Edsall, and D. V. Rottiers.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 177-180, 1976, 3 tab., 2 fig., 11 ref.

Descriptors: *Temperature, *Lethal limit, *Cisco, *Freshwater fish, *Environmental effects, *Heated water, Powerplants, Mortality, Resistance, Great Lakes, Water pollution sources, Size, Laboratory tests, Analytical techniques, *Thermal pollution.
Identifiers: *Coregonus spp., *Lake Whitefish, Temperature tolerance.

Laboratory tests indicated that the ultimate upper lethal temperature of young-of-the-year lake whitefish, Coregonus clupeaformis, an important food fish in the upper Great Lakes, was 26.65C. This value is similar to that reported for yearling bloaters, C. hoyi, at 26.75C and for young-of-the-year lake herring, C. artedii, at 26.0C. (Katz)
W77-03024

**UPPER LETHAL AND PREFERRED TEMPERATURES OF THE SLIMY SCULPIN, COTTUS COGNATUS,**
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
P. E. K. Symons, J. L. Metcalfe, and G. D. Harding.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 180-183, 1976, 1 tab., 1 fig., 16 ref.

Descriptors: *Temperature, *Lethal limit, *Heated water, *Sculpins, *Environmental effects, *Clear-cutting, Mortality, Laboratory tests, Distribution, Methodology, Watershed management, Water pollution effects, *Thermal pollution.
Identifiers: *Cottus cognatus, Upper lethal temperatures, Preferred temperature.

Laboratory experiments showed the upper lethal and preferred (96-h LT60) temperatures of slimy sculpin (Cottus cognatus) acclimated at 20C were 25.0 and 13C, respectively. (Katz)
W77-03025

**PHYSIOLOGICAL RESPONSES OF RAINBOW TROUT (SALMO GAIRDNERI) TO ELECTROSHOCK,**
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
C. B. Schreck, R. A. Whaley, O. E. Maughan, and M. Solazzi.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 76-84, 1976, 2 tab, 4 fig, 45 ref.

Descriptors: *Biochemistry, *Enzymes, *Mortality, *Fish physiology, *Rainbow trout, *Bioassay, *Electro-fishing, Analytical techniques, *Respiration, *Stress, *Metabolism, Oxygen sag, Environmental effects, Fishing, Sampling, Laboratory tests.
Identifiers: *Electrocardiogram, *Electroshocking.

Electroshocking caused an immediate increase in plasma corticoid and lactate concentrations and thrombocyte; leucocyte ratio in rainbow trout (Salmo gairdneri). Plasma glucose concentrations increased after 3 hours while protein, calcium, magnesium, and androgen levels were unaffected. Plasma lactate returned to preshock levels within 3 h, but corticoid and glucose concentrations were elevated for at least 6 h. Normal breathing was disrupted for 60 s post shocking. Breathing frequency did not increase, but buccal pressure increased substantially and returned to normal within 1 h. Cardiac activity was irregular immediately after shocking. The height of the T wave in EGGs increased 1-3 min after shocking. Responses exhibited are most likely attributable to combined effects of trauma, factors associated with paying off an oxygen debt and attributes associated with the general adaptation syndrome of stress. (Katz)
W77-03026

**MOVEMENT OF YELLOW PERCH (PERCA FLAVESCENS) AND WHITE SUCKER (CATOSTOMUS COMMERSONI) IN A NEARSHORE GREAT LAKES HABITAT SUBJECT TO A THERMAL DISCHARGE,**
Canada Centre for Inland Waters, Burlington (Ontario).
J. R. M. Kelso.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 42-53, 1976, 3 tab, 6 fig, 8 ref.

Descriptors: *Effluents, *Great Lakes, *Yellow perch, *Suckers, *Movement, *Distribution, *Fish behavior, *Heated water, *Water temperature, Water pollution sources, Thermal water, Temperature, Water pollution effects, Methodology, On-site data collection, *Thermal pollution.
Identifiers: *Catostomus commersoni.

The thermal discharge from the Nanticoke Generating Station caused both yellow perch (Perca flavescens) and white sucker (Catostomus commersoni) to increase sharpness of turns, decrease distance between turns, and to orient into the current generated by the discharge. Conversely, fish released in thermally unaffected habitats referenced movement to the shoreline, turned less sharply, and swam greater distances between turns. The tendency for localization of movement was increased for both species when in the influence of the discharge; however, these fish had to contend with currents generated by the effluent thus making comparisons anomalous. Exposure of fish to elevated temperatures was brief and ranged from a few excursions into thermally elevated areas to approximately 9 h. Fish transplanted from unaffected areas to the discharge areas showed behavior similar to fish caught and released at the discharge site. Two fish tracked when cooling was discharged at ambient temperature suggested that current had a role in causing the observed changes in behavior. (Katz)
W77-03027

**NEUROMUSCULAR FUNCTION AND ACETYLCHOLIN-ESTERASE IN THE PECTORAL ABDUCTOR MUSCLE OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES) AS EVIDENCED BY THE EFFECTS OF DIISOPROPYLFLUOROPHOSPHATE,**
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
P. W. Schneider,Jr, and L. J. Weber.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2153-2161, 1975, 1 tab, 4 fig, 27 ref.

Descriptors: *Organophosphorous compounds, *Biochemistry, *Fish physiology, *Enzymes, *Inhibitors, *Analytical techniques, *Bass, *Mode of action, Laboratory tests, Metabolism.
Identifiers: *Acetylcholinesterase, *Neuromuscular activity, *Diisopropylfluorophosphate, *DFP, Muscle function.

The significance of acetylcholinesterase (AChE) to neuromuscular transmission in the pectoral fin abductor muscle of largemouth bass (Micropterus salmoides) was evaluated by establishing in vivo, first, the occurrence of enzyme inhibition by diisopropylfluorophosphate (DFP) and, second, the correlation between muscular response to indirect stimulation and enzyme inhibition. Dose response curves for inhibition of AChE by DFP indicated that DFP had access to and did inhibit AChE. Modification of the muscular response was observed and severity appeared to be positively correlated to AChE inhibition. The modification, however, was not typical of cholinergic systems in that the ability to produce and maintain a tetanus was never abolished even with inhibition in excess of 99% of control levels. It was concluded that AChE is not as important for neuromuscular transmission in largemouth bass as has been established for other vertebrates, and that the acute toxic effects of DFP to largemouth bass are not mediated by a collapse of neuroskeletal muscle function. (Katz)
W77-03028

**VIABLE EMBRYOGENESIS OF THE WINTER FLOUNDER PSEUDOPLEURONECTES AMERICANUS FROM -1.8 DEG TO 15 DEG C,**
State University of New York at Stony Brook. Dept. of Ecology and Evolution.
G. C. Williams.

Marine Biology, Vol. 33, No. 1, p. 71-74, 1975, 1 tab, 2 fig, 13 ref.

Descriptors: *Fish physiology, *Embryonic growth stage, *Mortality, *Fish eggs, *Fish reproduction, *Temperature, *Freezing, *Hatching, *Lethal limit, *Water temperature, Laboratory tests, Environmental effects, Fishkill, New York.
Identifiers: *Flounders, Pseudopleuronectes americanus.

Pseudopleuronectes americanus spawns in late winter near New York, and its eggs may be found in shallow water under ice at temperatures below the usual freezing point of vertebrate tissues. Survival and duration of development at a variety of constant temperatures were recorded for artificially fertilized eggs in the laboratory. Many eggs hatched into normal larvae after 2 months at the lowest temperature tried, -1.8C. The upper lethal temperature was about 15C. There was a linear relation between log time and temperature in the minimum mortality range (0 to 10C), with a Q10 of about 4.8. (Katz)
W77-03029

**SUBLETHAL EFFECT OF 5-CHLOROURACIL ON CARP (CYPRINUS CARPIO) LARVAE,**
Oak Ridge National Lab. Oak Ridge, Tenn.
L. O. Eyman, C. W. Gehrs, and J. J. Beauchamp.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2227-2229, 1975. 1 fig., 9 ref.

Descriptors: *Toxicants, *Carp, *Larval growth stage, *Larvae, *Water pollution effects, *Pathology, *Fish diseases, *Mortality, *Fish eggs, *Bioassay, *Chlorine, Reproduction, Laboratory tests, Fish reproduction, Growth stages, Statistical methods.
Identifiers: *Sublethal effects, *5-Chlorouracil.

The sublethal effects of 5-clorouracil, expressed as gross anatomical malformations, on newly hatched carp (Cyprinus carpio) larvae are presented. The percent malformed of those hatched was 1.2 at 0.5 ppm, 2.1 at 1.0 ppm, 2.7 at 5.0 ppm, and 4.3 at 10 ppm. Both a least-squares fit of a hyperbolic model and a linear-regression fit are used to describe the response. The malformations are an incremental effect of exposure to a toxicant which should be considered in addition to egg mortality in assessing the effect of environmental toxicants on populations. (Katz)
W77-03031

**INCREASED OPERCULAR RATES OF PINK SALMON (ONCORHYNCHUS GORBUSCHA) FRY AFTER EXPOSURE TO THE WATER-SOLUBLE FRACTION OF PRUDHOE BAY CRUDE OIL,**
California State Univ., Chico. Dept. of Biological Sciences.
R. E. Thomas, and S. D. Rice.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2221-2224, 1975. 1 tab., 10 ref.

Descriptors: *Fish physiology, *Fish behavior, *Environmental effects, *Stress, *Water pollution effects, *Oil, *Pink salmon, *Fry, *Toxicants, *Metabolism, Salmon, Laboratory tests, Water pollution sources, Analytical techniques, Juvenile fish, Organic compounds.
Identifiers: *Opercular rates, *Sublethal effects.

The opercular rates of pink salmon (Oncorhynchus gorbuscha) fry were measured during 24-h exposure to sublethal concentrations of the water-soluble fraction of Prudhoe Bay crude oil. Opercular rates increased significantly for as long as 9 and 12 h after exposure to water-soluble fractions prepared from oil-water solutions of 2.83 and 3.46 ppm. The increases in rates appears to be a suitable method for detecting sublethal physiological effects of stress, because the observed changes occurred at approximately 20% of the 96 h-LC50. (Katz)
W77-03032

**CHLORINATED HYDROCARBONS IN CETACEANS,**
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5A.
W77-03033

**DIELDRIN IN THE DIET OF CHANNEL CATFISH (ICTALURUS PUNCTATUS): UPTAKE AND EFFECT ON GROWTH,**
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
R. L. Argyle, G. C. Williams, and C. B. Daniel.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2197-2204, 1975. 5 fig, 4 tab, 12 ref.

Descriptors: *Pesticide residues, *Growth rates, *Channel catfish, *Dieldrin, *Absorption, *Path of pollutants, *Fish diets, *Digestion, Laboratory tests, Analytical techniques, *Chlorinated hydrocarbon pesticides, Insecticides, Pesticides, Pollutant identification.
Identifiers: *Tissue analysis.

Fingerling channel catfish (Ictalurus punctatus) were given diets containing 0.4, 0.8, or 4.0 micrograms dieldrin/g of food for 210 days, followed by a dieldrin free diet for 56 days. Catfish receiving 4.0 micrograms dieldrin/g food gained about 17 percent less weight than the control fish in 210 days and about 35 percent less weight during the last 126 days of the 210-day period. No growth differences were apparent in the other test groups. Dieldrin accumulations were characterized by an immediate rapid rise in residual levels in the tissues, followed by a period during which concentrations were relatively stable. Residues in tissues decreased rapidly after dieldrin was withdrawn from the diet. Mean dieldrin half-life was 9.6 days. (Katz)
W77-03034

**EXCRETION OF AMMONIA AND INORGANIC PHOSPHOROUS BY EUPHAUSIA PACIFICA AND METRIDIA PACIFICA AT DIFFERENT CONCENTRATIONS OF PHYTOPLANKTON,**
British Columbia Univ., Vancouver. Inst. of Oceanography.
M. Takahashi, and T. Ikeda.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2189-2195, 1975, 6 fig, 23 ref.

Descriptors: *Zooplankton, *Metabolism, *Nutrients, *Ammonia, *Phosphorous, *Organic wastes, *Phytoplankton, *Cycling nutrients, *Nutrient removal, Populations, Laboratory tests, Kinetics.
Identifiers: *Euphausia pacifica, *Metridia pacifica, Excretion.

Roles of excretion in the forms of ammonia and inorganic phosphorous were determined for Euphausia pacifica and Metridia pacifica at different phytoplankton concentrations. Nutrient uptake rate of the phytoplankton sample was determined using Michaelis-Menten kinetics. The gross excretion of nutrients by zooplankton was estimated by summing the apparent excretion and nutrient removed by phytoplankton. Two significant effects of phytoplankton on zooplankton excretion were recognized: rapid removal from the medium of nutrients excreted by zooplankton and increase in nutrient excretion by zooplankton. The increase in nutrient excretion by zooplankton due to adding phytoplankton was proportional to the amount of phytoplankton ingested. Compared with the excretion rate at zero phytoplankton density, the excretion rate increased 5 times at 15 micrograms chlorophyll a/liter for M. pacifica and 9 times at 70 micrograms chlorophyll a/liter for E. pacifica. (Katz)
W77-03036

**QUANTITATIVE RELATIONS BETWEEN THE BRYOPHYTES OF THE BELGIAN PART OF THE RIVER SAMBRE AND THEIR FREQUENCY OF EMERSION: VERTICAL DISTRIBUTION AND INFLUENCE OF POLLUTION, (IN FRENCH),**
Liege Univ. (Belgium). Dept. of Botany.
For primary bibliographic entry see Field 5B.
W77-03038

**A LAKEWIDE STUDY OF PHYTOPLANKTON BIOMASS AND ITS SPECIES COMPOSITION IN LAKE ERIE, APRIL-DECEMBER 1970,**
Canada Centre for Inland Waters, Burlington (Ontario).
M. Munawar, and I. F. Munawar.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 3, p. 581-600, March, 1976, 12 fig, 8 tab, 47 ref.

Descriptors: *Eutrophication, *Biomass, *Lake Erie, *Sampling, *Phytoplankton, *Diatoms, *Nannoplankton, Seasonal, Population, *Biological communities, Distribution, *Spatial distribution, *Primary productivity, Aquatic microorganisms, On-site data collections, Food chains.
Identifiers: *Species composition.

Surface samples of phytoplankton were collected from April to December 1970 from 25 stations distributed over Lake Erie. About 125-150 species were identified in each basin. Certain species were identified as common to all three basins, while some phytoplankton species typified each basin. Diatoms contributed least in the Eastern basin (36%) but showed high percentage in both Central (55%) and Western (58%) basins. Phytoflagellates increased from the west to east basins and appeared to be adaptable to different nutrient conditions. During July and August high biomass concentrations but uneven horizontal distribution was observed. Phytoplankton biomass ranged between 0.8 and 13. 2, 0.6 and 6.0 and 1.0 and 4.2 g/cubic meter in the Wester, Central, and Eastern basins, respectively. Inshore-offshore differentiation was observed in the Central and Eastern Basins with many peaks in the inshore region. Bsed on maximum biomass concentration the Lake Erie Western basin was classified as highly eutrophic, the Eastern basin as mesotrophic and the Central basin between the mesotrophic and eutrophic conditions. (Katz)
W77-03039

**BEHAVIOR OF HYDRAZINE COMPOUNDS IN HARD AND SOFT WATER,**
Air Force Systems Command, Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 5B.
W77-03042

**THE EMERGENCE OF INSECTS FROM A BRITISH RIVER WARMED BY POWER STATION COOLING-WATER. PART I. THE USE AND PERFORMANCE OF INSECT EMERGENCE TRAPS IN A LARGE, SPATE-RIVER AND THE EFFECTS OF VARIOUS FACTORS ON TOTAL CATCHES, UPSTREAM AND DOWNSTREAM OF THE COOLING-WATER OUTFALLS,**
Central Electricity Generating Board, Ratcliffe-on-Soar (England). Freshwater Biology Unit.
T. E. Langford, and J. R. Daffern.
Hydrobiologia, Vol 46, No 1, p 71-114, 22 fig, 7 tab, 21 ref, 2 append.

Descriptors: *Environmental effects, *Water pollution effects, *Heated water, Temperature, Insects, Growth stages, Powerplants, River flow, *Thermal pollution, *Aquatic insects, Cooling water.
Identifiers: *Emergence patterns(Insects), *River Severn(UK).

The study was conducted upstream and downstream of Ironbridge A and B power stations on the River Severn. Traps used in catching adult emerging insects are described and their overall performance, total catches and species selectivity is related to the physical characteristics of the river. Some relationship was observed between emergence rates, river flow and temperatures but the data suggested that the most significant factor was river flow. Temperature increases did not appear to have a significant effect on the total numbers overall emergence period of Trichoptera, Ephemerptera and Megaloptera. (See also W77-03044) (Chilton-ORNL)
W77-03043

**THE EMERGENCE OF INSECTS FROM A BRITISH RIVER, WARMED BY POWER STATION COOLING-WATER. PART II. THE EMERGENCE PATTERNS OF SOME SPECIES OF EPHEMEROPTERA, TRICHOPTERA, AND MEGALOPTERA IN RELATION TO WATER TEMPERATURE AND RIVER FLOW, UPSTREAM AND DOWNSTREAM OF THE COOLING-WATER OUTFALLS,**
Central Electricity Generating Board, Ratcliffe-on-Soar (England). Freshwater Biology Unit.
T. E. Langford.
Hydrobiologia, Vol 47, No 1, 1975, p 91-133, 11 tab, 11 fig, 46 ref.

Descriptors: *Environmental effects, *Heated water, Water pollution effects, Temperature, Insects, Growth stages, Powerplants, *Thermal pollution, *Aquatic insects, *Mayflies, Water temperature, Cooling water.
Identifiers: *Emergence patterns(Insects), *River Severn(UK), *Megaloptera, *Trichoptera.

No evidence of early emergence patterns downstream from the power station were observed. Temperature increases reached 8C, maximum water temperatures reached 28C, total degree-hours increased to 24% more during the spring, and there was a four-week advance in degree-hour accumulation. Emergence for most species was observed at 12C to 28C. High temperatures did appear to halt emergence or shorten the emergence period. (See also W77-03043) (Chilton-ORNL)
W77-03044

**FIDELITY OF THERMOPHILIC BLUE-GREEN ALGAE TO HOT SPRING HABITATS,**
Oregon Univ., Eugene Dept. of Biology.
J. E. Jackson, Jr., and R. W. Castenholz.
Limnology and Oceanography, Vol 20, No 3, May 1975, p 305-322, 6 fig, 5 tab, 17 ref. NSF GB-31945X.

Descriptors: *Environmental effects, *Thermal pollution, *Heated water, *Hot springs, Algae, *Cyanophyta, Aquatic plants, *Wyoming, National Parks.
Identifiers: *Thermophilic plants, Willamette Valley(Wyo), *Yellowstone National Park.

Samples from the Yellowstone Plateau and the Willamette Valley were incubated in photoautotrophic medium at 14, 35, and 45C. Blue-green algae developed at 35C in samples from numerous habitats. At 45C, the growth of blue-green algae was apparent in samples taken from sources downstream of heated waters but not in samples taken above heated discharges. These results indicate generally that the number of indentifiable hot spring blue-green algal species in rivers and the number of recoverable colonies are inversely related to the distance downstream from the points of hot spring discharge. Thermophilic blue-green algae having a growth temperature optimum of over 45C have a high fidelity to heated water habitats in temperate or colder climates but some species may be established elsewhere in warmer areas. (Chilton-ORNL)
W77-03045

**THE EFFECT OF THE DISCHARGE OF THERMAL EFFLUENT FROM A POWER STATION ON THE PRIMARY PRODUCTIVITY OF AN EPIPHYTIC ALGAL COMMUNITY,**
Alberta Univ., Edmonton. Dept. of Botany.
M. Hickman, and D. M. Klarer.
Br. phycol. J., Vol 10, March 1975, p 81-91, 2 fig, 2 tab, 41 ref.

Descriptors: *Environmental effects, *Water pollution effects, *Thermal pollution, Heated water, Powerplants, Algae, Temperature, Biological communities, Standing crops, *Primary productivity, *Canada, Lakes.
Identifiers: *Epiphytic algae, *Lake Wabamun(Alberta).

Thermal discharges were shown to cause an increase in the standing crop size of the epiphyton associated with Scripus validus and the mean primary productivity increased as a result. Thermal discharges were also found to cause changes in species composition and dominance in algal communities. The most noticeable difference between heated and non-heated areas was the occurrence as dominants of Oedogonium and Spirogyra during the spring and late summer at the heated site. The heated water approximately doubled the photosynthetic index of the non-heated site samples suggesting that the algal populations in the non-heated area were not photosynthesising at optimum temperatures. Continuous flow of heated water appeared to cause a decrease in photosynthetic efficiency in the heated area. (Chilton-ORNL)
W77-03046

**HETEROMORPHIC DEVELOPMENT OF AEDINE MOSQUITOES REARED AT ABNORMAL TEMPERATURES,**
Illinois Univ. at Urbana-Champaign. Dept. of Entomology.
W. R. Horsfall.
Annals of Zoology, Vol 11, 1974, p 224-236, 15 fig, 28 ref.

Descriptors: *Environmental effects, *Temperature, *Mosquitoes, Sexual maturity, Laboratory tests, Reproduction, Gonads, Aquatic insects.
Identifiers: *Heteromorphic development(Insects).

Morphic variations in the adult stage of several species of mosquitoes were induced by different constant temperatures in the laboratory. The report includes descriptions of the modifications exhibited by the normally male-producing component when reared at constant temperatures of 21-28C. High temperature was found to inhibit the expression of the male features but not those of the female. Resulting adults are heteromorphic in degree of maleness according to the temperature. (Chilton-ORNL)
W77-03047

**RELATION OF WATER TEMPERATURE TO FLEXIBACTER COLUMNARIS INFECTION IN STEELHEAD TROUT (SALMO GAIRDNERI) COHO (ONCORHYNCHUS KISUTCH) AND CHINOOK (O. TSHAWYTSCHA) SALMON,**
Oregon State Univ., Corvallis. Dept. of Microbiology.
R. A. Holt, J. E. Sanders, J. L. Zinn, J. L. Fryer, and K. S. Pilcher.
Journal of the Fisheries Research Board of Canada, Vol 32, No 9, 1975, p 1553-1559, 1 fig, 3 tab, 7 ref. EPA No. R 800171.

Descriptors: *Environmental effects, *Pathogenic bacteria, Temperature, Salmonids, *Chinook salmon, Trout, Mortality, *Water temperature, *Rainbow trout.

Experimental fish were subjected to eight temperatures increasing from 3.9 to 23.9C by increments of 2.8C. The results indicated that the effects of water temperature on experimental infection with F. columnaris were very similar in the three species of salmonids studied. The lowest temperature at which deaths were observed was 12.2C, while mortality increased progressively with increasing temperature in the range of 12.2 to 20.5C. At 9.4C and below, conditions were unfavorable for progress of the infection. (Chilton-ORNL)
W77-03048

**TEMPERATURE-INDUCED CHANGES IN ACUTE TOXICITY OF ZINC TO ATLANTIC SALMON (SALMO SALAR),**
Guelph Univ., (Ontario). Dept. of Zoology.
P. V. Hodson, and J. B. Sprague.
Journal of the Fisheries Research Board of Canada, Vol 32, No 1, 1975, p 1-10, 3 fig, 3 tab, 45 ref.

Descriptors: *Environmental effects, *Water pollution, Water pollution effects, *Toxicity, *Zinc, *Atlantic salmon, Temperature, Mortality, Chemical wastes.

Three groups of Atlantic salmon parr were acclimated to water temperatures of 3, 11, and 19C and were then exposed (at their acclimation temperatures) to lethal concentrations of zinc. The results showed that cold-acclimated salmon survived longer than did warm-acclimated salmon but there was less toxicity at the higher temperature. Temperature-acclimated fish were about 50% more tolerant of zinc at 19C than at 3C. Sudden temperature changes altered thresholds even more. It was concluded that, in polluted rivers, zinc concentrations may be most damaging to fish populations during the winter months. (Chilton-ORNL)
W77-03049

**EFFECTS OF WATER TEMPERATURE AND HOUSING CONDITIONS UPON THE AGGRESSIVE BEHAVIOR OF THE LOBSTER HOMARUS AMERICANUS,**
Dalhousie University, Halifax, Nova Scotia, Canada, Department of Psychology.
R. S. Hoffman, P. J. Dunham, and P. V. Kelly.
Journal of the Fisheries Research Board of Canada, Vol 32, No 5, 1975, p 713-717, 2 fig, 17 ref.

Descriptors: *Environmental effects, Temperature, *Animal behavior, Laboratory animals, Laboratory tests, *Lobsters, *Water temperature, Water pollution effects, Fish behavoir.
Identifiers: *Aggressive behavior(Lobsters).

Data showed that experimental animals housed at 5 and 10 degrees C showed more aggressive behavior at 10C than at 5C. The data demonstrated that individually housed lobsters were particularly more aggressive at higher temperatures than communally housed animals or those in physical isolation with visual contact. (Chilton-ORNL)
W77-03050

**REGULATION OF OXYGEN CONSUMPTION BY INCIDENT ILLUMINATION IN EMBRYONATED OVA OF ATLANTIC SALMON SALMO SALAR L.,**
Dalhousie Univ., Halifax, Nova Scotia. Dept. of Biology.
T. Hamor, and E. T. Garside.
Comparative Biochemistry and Physiology, Vol. 52 A, 1975, p 277-280, 4 tab, 19 ref.

Descriptors: Environmental effects, *Light, *Respiration, *Atlantic salmon, Biochemical oxygen demand, *Embryonic growth stage, *Water pollution effects.

The possible effect of incident illumination on respiratory performance of Atlantic salmon was measured in 18 factorial combinations of 5 and 10

degrees C, 30, 50 and 100% air-saturation and respirometer flowmrates of 0.4, 0.8, and 1.6 ml/min. Oxygen consumption was found to be generally greater at 10C than in comparable environments at 5C. Oxygen consumption increased in all all incubation environments from 1-2001x and then decreased rather abruptly near 250 lx. Three interactions, temperature and oxygen level, flow rate and light, and temperature and oxygen and light have significant effects. Other potential interactions did not reach the threshold for probable effect. (Chilton-ORNL)
W77-03051

**WINTER FLOUNDER MOVEMENTS, GROWTH, AND MORTALITY OFF MASSACHUSETTS,**
Massachusetts Dept. of Natural Resources, Sandwich. Div. of Marine Fisheries.
A. B. Howe, and P. G. Coates.
Transactions of the American Fisheries Society, Vol. 104, No. 1, 1975, p 13-29, 13 fig, 2 tab, 26 ref.

Descriptors: *Fish migration, *Growth rates, *Mortality, Fish, *Massachusetts, Tagging, Atlantic Ocean.
Identifiers: *Flounder, Pseudopleuronectes americanus, *Cape Cod(Mass), Fish movement.

Fish were tagged at locations selected on the basis of known local concentrations during late March through April in 1960-1965. Returns through 1971 were 36.5%. Movements north of Cape Cod were relatively localized and confined to inshore waters but movements south of Cape Cod were seasonally dispersed in a southeastward direction generally beyond the territorial limit. There appeared to be a relationship between water temperature and movements. Data showed that females grew more rapidly than males south of Cape Cod. Fish released in Vineyard and Nantucket Sounds showed exploitation rates of 0.201, natural mortality rates of 0.273, and total mortality rates of 0.474. (Chilton-ORNL)
W77-03052

**ABUNDANCE AND POPULATION DYNAMICS OF PARASITES INFECTING ATLANTIC SALMON (SALMO SALAR) IN TROUT BROOK, NEW BRUNSWICK, CANADA,**
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
G. M. Hare, and M. D. B. Burt.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 11, 1975, p 2069-2074, 3 fig, 4 tab, 18 ref.

Descriptors: Ecology, Population, *Parasitism, Animal parasites, *Fish parasites, *Atlantic salmon, *Canada, Seasonal, Age, Infection.
Identifiers: *Trout Brook(NB).

The parasite fauna of juvenile Atlantic salmon in Trout Brook was found to be composed of four primary species, the monogenean Discocotyle sagittata (infecting 37.7% of the fish examined), the digenean Crepidostomum farionis (40.5%), the nematode Sterliadochona tenuissima (97.9%), and a glochidium (32.0%). Six secondary species infected the juvenile salmon. Intensity of infection of C. farionis and S. tenuissima was independent of host age and sex. Males were found to be more heavily infected with D. sagittata but this parasite was also independent of host age. No interactions were observed between season and host age nor between season and host sex. D. sagittata was found to be most abundant in summer and autumn, C. farionis and S. tenuissima in spring, and the glochidium in autumn. Annual cycles of infection were indicated by relationships between changes in parasite maturation and in seasonal abundance. (Chilton-ORNL)
W77-03053

**THE EFFECT OF TEMPERATURE-SALINITY COMBINATIONS ON THE FUNCTIONAL WELL-BEING OF ADULT LYTECHINUS VARIEGATUS (LAMARCK) (ECHINODERMATA, ECHINOIDEA),**
University of South Florida, Tampa. Dept. of Biology.
J. M. Lawrence.
Journal of Experimental Marine Biology and Ecology, Vol. 18, p 271-275, 1 tab, 15 ref.

Descriptors: *Environmental effects, *Salinity, *Temperature, Aquatic life, *Florida, Coasts, *Gulf of Mexico, Water temperature.
Identifiers: *Sea urchins, Lytechinus variegatus.

In 1971 large, dense aggregations of sea urchins were observed off the Florida Gulf coast. The aggregations were active in August and September but were dispersed with many dead individuals in October. The purpose of the present work was to ascertain the effect of various combinations of temperature and salinity on the viability of the sea urchins. The highest activity coefficient was found to be at 35% salinity and 28C. Increases in temperature and salinity above ambient levels had more effect on the urchins than decreases in temperature and salinity. A reduction of salinity to 25% along with an increase in temperature to 34C caused death of the urchins, while this level of reduction of salinity along with a decrease in temperature only reduced their viability. The area where the mass mortalities occurred is marked by large quantities of river discharge during rainy seasons and the waters are shallow resulting in extreme temperatures. (Chilton-ORNL)
W77-03054

**DISTRIBUTION OF FISH SPECIES IN GREAT BEAR LAKE, NORTHWEST TERRITORIES, WITH REFERENCE TO ZOOPLANKTON, BENTHIC INVERTEBRATES, AND ENVIRONMENTAL CONDITIONS,**
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
L. Johnson.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 11, 1975, p 1989-2004, 8 fig, 6 tab, 47 ref.

Descriptors: *Environmental effects, *Competition, Ecosystems, Lakes, Oligotrophy, Arctic, *Zooplankton, Benthos, Benthic fauna, *Invertebrates, *Canada, *Distribution, Fish.
Identifiers: Species diversity, *Great Bear Lake(NWT).

Great Bear Lake is extremely oligotrophic and this is considered to have had the effect of reducing species diversity in the lake. Highest concentrations of benthic invertebrate were found in the upper 20 m with only Mysis relicta and Myoxocephalus quadricornis existing in measurable densities below 100 m. Salvilinus namaycush and M. quadricornis were found at depths from 3-400 m and at temperatures of 13.2C for M. quadricornis and 15C for S. namaycush. Whitefish were found only in the bays. Stizostedion vitreum, Lota lota, and Catostomus catostomus were found only at the periphery of the lake. Couesius plumbeus and Percopsis omiscomaycus were found in the headwaters and in Great Bear River but not in the lake. It was suggested the low number of species present in some arctic lakes is due to environmental or competitive exclusion rather than to ecosystem immaturity. (Chilton-ORNL)
W77-03055

**REPRODUCTION OF WHITE PERCH IN THE LOWER HUDSON RIVER,**
New York Power Pool, Schnectady, N. Y. Environmental Affairs Office.
For primary bibliographic entry see Field 2L.
W77-03058

**INVESTIGATION OF THE SALMON (SALMO SALAR) SMOLT MIGRATION OF THE BIG SALMON RIVER, NEW BRUNSWICK, 1966-72,**
Fisheries and Marine Service, Halifax (Nova Scotia). Dept. of Environment.
B. M. Jessop.
Technical Report Series No. MAR/T-75-1, 57 p, 5 fig, 28 tab, 30 ref, 6 append.

Descriptors: *Ecology, *Biorhythms, *Migration, Fish behavior, *Fish migration, *Smolt, *Salmon, Data collections, Water flow, Temperature, Size, Fish populations, Timing, *Canada.
Identifiers: Big Salmon River(NB).

A counting fence near the mouth of the Big Salmon River was used to collect data on the timing and duration of Atlantic salmon smolt migration, and on smolt numbers, sizes, sex ratios, and ages. During each year of the study, the timing of smolt migration was between May 7-28 to June 15-July 13. The 6 year mean average of numbers of smolt counted was 15,570. A relationship was observed between timing of the smolt run and water level and water temperature. Most smolts (90%) migrated at night but the number of smolts migrating during daylight hours increased during the latter part of the run. Mean smolt lengths ranged from 13.5 to 15.1 cm and were significantly different between years. Smolt yield for all ages was 4.0/100 sq. meters. (Chilton-ORNL)
W77-03059

## 5D. Waste Treatment Processes

**SOME INTERNAL MEASURES FOR REDUCING EFFLUENT LOAD, FOR EXAMPLE, IN A CALCIUM BISULFITE MILL (EINIGE INNERBETRIEBLICHE MASSNAHMEN ZUR VERMINDERUNG DER VORFLUTERBELASTUNG, DARGESTELLT AM BEISPIEL EINER CALCIUMBISULFITFABRIK),**
Schwaebische Zellstoff A. G., Ehingen/Donau (West Germany).
J. P. Franzreb.
Das Papier, Vol. 30, No. 9, p 384-389, September, 1976. 6 fig, 4 ref.

Descriptors: *Pulp wastes, *Water pollution control, *Bleaching wastes, *Sulfite liquors, Lignins, Wastes, Industrial wastes, Pollutants, Water pollution sources, Evaporators, Acids, Chlorination.
Identifiers: *Sulfite pulp mills, Lignosulfonic acids, Condensates, Alkaline extraction, Chlorolignins, Spills, Pulp washing, Pulp bleaching, Wood extractives.

Collection of at least 98% of the waste liquor is the primary measure proposed. The proposed combination of diffusion and filter washing has proved effective with fir and beech. A closed separation (screen room) with no effluent is included. Such extensive effluent control will have long-term success only with elimination of accidental spills. A possible solution is described. Three types of water pollutants may come from evaporator condensates: lignosulfonic acids, volatile neutral compounds like furfural and methanol, and volatile acids like acetic. Reduction of contamination by each of these types is discussed. Effluent contamination from the bleach plant is a special problem; 70-90% of this results from the chlorination and alkaline extraction steps. A possible measure for reducing chlorolignins and alkaline extractives in the bleaching effluent is described. (Ward-IPC)
W77-02576

**PURIFICATION OF WASTE WATERS AT CELLULOSE ATTISHOLZ (EPURATION DES EAUX RESIDUAIRES A LA FABRIQUE DE CELLULOSE DE ATTISHOLZ),**
Papier, Carton et Cellulose, Vol. 25, No. 8/9, p 54-55, August/September, 1976. 1 fig, 2 illus.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, Water pollution treatment, Water pollution sources, Wastes, Industrial wastes, Biological treatment, Sludge treatment, Dewatering, Incineration, Bark, Europe, Foreign countries, Waste treatment, Water pollution control, Pulp and Paper industry.
Identifiers: *Switzerland.

The effluent treatment facilities at Cellulose Attisholz AG., Switzerland, are briefly described, including the physicochemical treatment stage, biological treatment stage, and the dewatering and incineration stage for sludge and bark residues. (Speckhard-IPC)
W77-02577

**WATER RESOURCE MANAGEMENT IN THE CZECHOSLOVAKIAN PAPER INDUSTRY DURING THE FIFTH FIVE-YEAR PLAN PERIOD (VODNI HOSPODARSTVI PAPIRENSKEHO PRUMYSLU CSR V PATE PETILETCE),**
For primary bibliographic entry see Field 3E.
W77-02578

**DETERMINATION OF MONOHYDRIC LOW-MOLECULAR PHENOLS IN SPENT LIQUORS AND PULP MILL EFFLUENTS (BADANIA NAD OZNACZANIEM JEDNOWODOROTLENOWYCH NISKOCZASTECZKOWYCH ZWIAZKOW FENOLOWYCH W LUGACH I SCIEKACH Z CELULOZOWNI),**
For primary bibliographic entry see Field 5A.
W77-02579

**POSSIBILITY OF INTRODUCING WASTE-FREE TECHNOLOGY IN THE PULP AND PAPER INDUSTRY (VOZMOZHNOSTI VNEDRENIYA BEZOTKHODNOI TEKHNOLOGII V OTRASLI),**
For primary bibliographic entry see Field 3E.
W77-02583

**AUTOMATION OF TOTAL PHENOLIC CONTENT DETERMINATION WITH THE FOLIN-CIOCALTEU REAGENT. APPLICATION TO THE STUDY OF WASTE WATERS FROM FIBERBOARD MILLS (AUTOMATISATION DE LA METHODE DE DOSAGE DES COMPOSES PHENOLIQUES TOTAUX PAR LE REACTIF DE FOLIN-CIOCALTEU. APPLICATION A L'ETUDE DES EAUX RESIDUAIRES DES USINES DE PANNEAUX DE FIBRES DE BOIS),**
Institut National de la Recherche Agronomique, Dijon (France). Technologie.
For primary bibliographic entry see Field 5A.
W77-02584

**MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. I. STUDY OF LIGNIN DECOMPOSITION PRODUCTS (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. I. ISSLEDOVANIE PRODUKTOV RAZRUSHENIYA LIGNINA),**
Vsesoyuznyi-Nauchnyi Planovii Otdel Bumazhnoi Promyshlennostn Moscow (USSR).
For primary bibliographic entry see Field 5B.
W77-02585

**MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. II. PHYSICOCHEMICAL PROPERTIES OF LIGNIN DECOMPOSITION PRODUCT (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. II. FIZIKO-KHIMICHESKAYA KHARAKTERISTIKA PRODUKOV RAZRUSHENIYA LIGNINA),**
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost Moscow (USSR).
For primary bibliographic entry see Field 5B.
W77-02586

**MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. III. STUDY OF CARBOHYDRATE DECOMPOSITION PRODUCTS (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. III. IZUCHENIE PRODUCKTOV RAZRUSHENIYA UGLEVODNOI CHASTI DREVESINY),**
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost Moscow (USSR).
For primary bibliographic entry see Field 5B.
W77-02587

**INVESTIGATION OF COMMERCIAL CHROME-TANNING SYSTEMS: PART VI. FULL-SCALE TRIALS OF CHROME LIQUOR RECYCLING AND THE IMPORTANCE OF SALT CONCENTRATION,**
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Protein Chemistry.
J. E. Burns, D. E. Colquitt, M. H. Davis, and J. G. Scroggie.
Journal of the Society of Leather Technologists and Chemists, Vol. 60, No. 4, p 106-112, July/August, 1976. 3 fig, 4 tab, 19 ref.

Descriptors: *Tannery wastes, *Waste water treatment, *Recycling, *Chromium, *Industrial wastes, Symbiosis, Reclamation, Chemical wastes, Liquid wastes, Effluents, Water reuse.
Identifiers: Tanneries.

A method for recycling chrome tanning liquors which is suitable for short pickling times is described. Spent chrome liquor is used as a base for the preparation of the pickle liquor for the following pack of hides or skins. Between each cycle, the spent liquor is reconstituted by the addition of the full amount of mineral acid normally used in pickling together with a reduced amount of the desired masking agent. The conventionally delimed/bated pelt is then pickled with this liquor for the desired time after which the calculated reduced amount of the chrome reagent is added to give the usual total chromium concentration. Control of ionic strength during pickling/tanning with the recycled liquors is vital for maintaining leather quality, and this can be achieved by simply controlling specific gravity despite a progressive change from a chloride to a sulfate pickle system during the process. The concentration of chromium appearing in the tannery effluent can be greatly reduced with careful attention to the recovery of all chromium-containing liquors. (Kreager-FIRL)
W77-02594

**THE CONTROL OF WATER POLLUTION AND THE DISPOSAL OF SOLID WASTES IN THE INDUSTRIES PRODUCING BASIC INORGANIC CHEMICALS,**
Imperial Chemical Industries Ltd., London (England). Engineering Services Dept.
F. J. Wagstaffe.
Pure and Applied Chemistry, Vol. 45, No. 3/4, p 141-145, 1976. 7 ref.

Descriptors: *Industrial wastes, *Chemical industry, *Waste water treatment, *Recycling, *Chemical wastes, Solid wastes, Suspended solids, Separation techniques, *Inorganic compounds, Bubbles, Flocculation, Mercury, Calcium sulfate.
Identifiers: Magnetic separation.

Developments in the control of water pollution generated by the basic inorganic chemicals industry are reviewed. The use of diaphragm cells rather than mercury cells for the manufacture of chlorine is one means of reducing mercury pollution from chlor-alkali plants. A development in the removal of suspended solids from effluents containing a few hundred milligrams/liter of such solids involves the use of tube modules in conventional horizontal flow clarifiers. A technique in which gas bubbles are induced to attach themselves to flocculated solids permits the removal of the solids and floc in an overflow rather than an underflow manner. High gradient magnetic fields are being used to remove finely divided magnetic solids from aqueous streams. The recovery of waste calcium sulfate from the manufacture of phosphoric and hydrofluoric acids is being investigated as a solution to the inorganic chemicals industry's most important single solid waste disposal problem. (Kreager-FIRL)
W77-02595

**INCINERATION OF INDUSTRIAL WASTES,**
Minnesota Mining and Mfg. Co., St. Paul.
For primary bibliographic entry see Field 5E.
W77-02596

**THE CATALYTIC WET OXIDATION OF STRONG WASTE WATERS,**
Catalytic Inc., Charlotte, N. C.
A. K. Chowdhury, and L. W. Ross.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 46-58, 1975. 14 fig, 10 tab, 11 ref.

Descriptors: *Oxidation, *Catalysts, *Waste water treatment, *Chemical oxygen demand, *Organic compounds, Liquid wastes, Chemical wastes, Kinetics, Chemical reactions, Pressure, Temperature, Oxygen, Efficiencies, Performance, Evaluation, Sulfates, Iron compounds, Copper sulfate, Oxides.
Identifiers: Fenton catalysts, Platinum oxide, Hydrogen peroxide.

Catalysts for the wet oxidation of strong waste waters (chemical oxygen demand of 3500-15,000) were investigated. Copper sulfate, ferric sulfate, and hydrogen peroxide were the most effective catalysts over a wide pH range (2.8-7.0), with typical chemical oxygen demand reductions of over 95% being achieved at 400 F. Fenton catalysts produced comparable results but only at a pH of 2.5. Platinum oxide gave the best results among various solid catalysts tested. The pressure of the reaction system did not exert any effect on catalytic wet oxidation over a range of 300-900 pounds/sq in. Air was as effective as oxygen in carrying out the oxidation reactions as long as adequate oxygen was maintained with proper stirring. Beyond temperatures of 400 F, a leveling off of the catalytic oxidation rate was observed. Catalytic oxidation of waste water obeyed first order kinetics. Wet oxidation is most effective when the organic content of the solution to be treated is high (chemical oxygen demand of more than 3500 milligrams/liter); thus the efficient operation of the process, a pretreatment step for increasing the organic concentration is necessary. (Kreager-FIRL)
W77-02597

**APPLICATION OF ULTRA FILTRATION/REVERSE OSMOSIS TECHNIQUE FOR THE FRACTIONATION OF CHEESE WHEY - A WASTE DISPOSAL OF THE DAIRY INDUSTRY,**
Central Salt and Marine Chemicals Research Inst., Bhavnagar (India).
A. V. Rao, B. J. Bhalala, and D. J. Mehta.
Indian Chemical Journal Vol. 10, No. 12, p 19-23, June, 1976. 3 fig, 2 tab, 4 ref.

Descriptors: *Dairy industry, *Food processing industry, *Filtration, *Reverse osmosis, *Waste

water treatment, Byproducts, Recycling, Separation techniques, Liquid wastes, Proteins, Chemical oxygen demand, Industrial wastes, Efficiencies, Performance, Membrane processes, Membranes, Water reuse, Nutrients.
Identifiers: Sugars, Lactose.

Ultrafiltration membrane optimization studies with cellulosic polymers were conducted to develop a suitable membrane for the separation of protein and lactose from cheese whey which is often disposed of as liquid waste. Protein rejection by the membrane was maintained at over 90% throughout the entire operation, and lactose rejection was kept at a minimum of 2.0%. About 80% of the lactose and 70% of the protein originally present in the cheese whey appear to be recoverable in the ultrafiltrate and concentrate, respectively. The ultrafiltrate can be further concentrated in a reverse osmosis unit to reduce the chemical oxygen demand level of the protein-free filtrate. The permeate from this second stage can then be reused in dairies as fresh water. (Kreager-FIRL)
W77-02598

**AEROBIC AND ANAEROBIC MICROBIAL TREATMENT ALTERNATIVES FOR SHELLFISH PROCESSING WASTEWATERS IN CONTINUOUS CULTURE,**
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
F. G. Pohland, and J. W. Hudson.
Biotechnology and Bioengineering, Vol. 18, No. 9, p 1219-1247, September, 1976. 13 fig, 2 tab, 11 ref.

Descriptors: *Food processing industry, *Waste water treatment, *Biological treatment, *Aerobic conditions, *Anaerobic conditions, Kinetics, Model studies, Microorganisms, Organic compounds, Solid wastes, Separation techniques, Hydraulics, Methane, Efficiencies, Oxidation, Shellfish, Industrial wastes.
Identifiers: Shellfish processing.

Aerobic and anaerobic microbial treatment of shellfish processing waste water were investigated, and a kinetic model based on continuous culture kinetics was developed for the former treatment scheme. Aerobic oxidation of shellfish processing waste water were investigated, and a kinetic model based on continuous culture kinetics was developed for the former treatment scheme. Aerobic oxidation of shellfish processing waste water proved to be a satisfactory means of reducing soluble organic constituents to acceptable levels and the results of bench-scale studies were amenable to continuous culture analysis with kinetic models which enabled certain design and/or operational criteria to be formulated. A critical hydraulic retention time about 2 hr was estimated for single-pass treatment modes; and with solids recycle, the critical hydraulic retention time could be reduced to about 1 hr. The efficiency of biological solids separation was markedly affected by changes in applied dilution rates and was of major importance in determining the best operating mode and overall system performance. The kinetic description of anaerobic biological treatment using continuous culture analysis was not achieved. However, anaerobic treatment exhibited a limited potential for waste water stabilization in that soluble substrate removals and methane production occurred at all retention times. Solids recycle tended to increase treatment efficiencies in both aerobic and anaerobic processes. (Kreager-FIRL)
W77-02599

**SYNCRUDE VOWS ENVIRONMENTAL RESPONSIBILITY,**
Syncrude Canada Ltd., Edmonton (Alberta).
D. Tost.
Hydrocarbon Processing, Vol. 55, No. 10, p 102-106, October 1976. 1 fig.

Descriptors: *Oil industry, *Reclamation, *Mining, *Oil wastes, *Environmental engineering, Industrial wastes, Revegetation, Runoff, Erosion, Surface water, Research priorities, Programs.

Syncrude's environmental protection program for its 17,000-acre synthetic crude oil projects in Alberta, Canada's Athabasca Tar Sands, the worlds' largest open pit mining and reclamation operation, is outlined. Initial environmntal work was started by Syncrude in 1962 and centered on broad baseline studies of the surrounding soil, vegetation, water, animal and bird populations, and atmospheric patterns. About $300 million is being spent on environmental research and pollution control systems for the open pit mining operation which is projected to come on stream in mid-1978. Syncrude's long-range goal is to revegetate with native grasses and trees the 10 sq mi comprising the mine site once the area is mined out. The most difficult task is expected to be establishing growth on the tailings dike that surrounds the 10-square-mile tailings pond in order to prevent erosion and washout and to contain runoff from polluting nearby rivers and streams. The dike which will range from 10-180 ft high will contain the sand, water, and unrecoverable effluent from the bitumen extraction process. (Kreager-FIRL)
W77-02600

**WASTEWATER REQUIREMENTS MULTIPLY SOLIDS PROBLEMS,**
Texas Univ. at Dallas, Richardson.
For primary bibliographic entry see Field 5G.
W77-02601

**IMPACT OF WATER CONSERVATION IN THE DESIGN OF MODERN OIL REFINERIES,**
Fluor Engineers and Constructors, Inc., Los Angeles, Calif.
H. J. Klooster, and R. A. Beardsley.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 14-24, 1975. 4 fig, 7 tab, 4 ref.

Descriptors: *Oil industry, *Reclaimed water, *Water conservation, *Water reuse, *Waste water treatment, Industrial wastes, Liquid wastes, Symbiosis, Reclamation, Ammonia, Hydrogen sulfide, Dewatering, Sludge, Filtration, Recycling, Design.

Water conservation measures for modern oil refineries are outlined. The first step in the process of reducing waste effluents is to segregate wastes streams according to the degree of treatment required. Sour condensates produced in crude units and hydrocrackers can be reused as crude condenser wash water, desalter wash water, and/or recycled water for the hydrocracker after simple stream stripping to remove ammonia and hydrogen sulfide. High mineral, non-toxic salt concentrated streams which are not contaminated with organics can be reused for various process requirements after desalination and/or mechanical evaporation. Some waste streams containing non-hardness and non-siliceous mineral salts but otherwise contaminated with organics may be used as cooling tower makeup. Filter backwash may be recycled to the inlet of the clarifier without any added treatment, and the recycled filtrate may aid in the solids settling rate in the clarifier, thereby enhancing the clarifier operation. Decant water from sludge dewatering may also be recycled to the clarifier feed. (Kreager-FIRL)
W77-02602

**EIGHTH MEETING OF THE IULTCS TANNERY WASTES COMMISSION, SVENDBORG, DENMARK, 21ST TO 23RD MAY 1975.**
Journal of the Society of Leather Technologists and Chemists, Vol 60, No 4, p 95-105, July/August, 1976. 7 tab, 18 ref.

Descriptors: *Tannery wastes, *Waste water treatment, *Biological treatment, *Water reuse, *Waste disposal, Solid wastes, Sludge, Denitrification, Filtration, Separation techniques, Industrial wastes, Membranes, Oxygen demand, Chromium, Sulfides, Sewage, Effluents, Physical control, Analytical techniques, Byproducts, Symbiosis, Toxicity.
Identifiers: Tanneries.

The following annual reports on topics dealing with tannery wastes were presented at the eighth meeting of the IULTCS Tannery Wastes Commission. Methods for Depilation (W. Frendrup); Improvements in the Uptake of Tannins by Skin (A. J. J. van Meer); Sulphide Oxidation (A. J. J. van Meer); Methods of Biological Treatment (A. J. J. van Meer); Toxic Effects of Sulphide and Chromium (D. R. Corning); Mixing of Tannery Effluent with Domestic Sewage (W. Frendrup); Sludges - Storage and DIsposal (M. Aloy); Specific Criteria for the Discharge of Tannery Effluents (J. Gauglhofer); Charging for Tannery Waste Water Disposal (Mr. van Vlimmeren); Disposal of Solid Wastes (L. Feikes); Reuse of Water (B. Gorecki and J. Ludvik); and Chemical Treatment of Tannery Effluents (L. Feikes and L. Del Pezzo). In addition to these topics, the following other subjects were discussed: new developments in the treatment of tannery wastes, chromium recovery methods, sludge applications in agriculture, denitrification studies, the organization of an international symposium on tannery wastes, analytical methods for determining oxygen demand parameters, membranes for ultrafiltration units, statistics on the incidence of anthrax, and the maximum admissible concentration limits for aluminum in waste water. (Kreager-FIRL)
W77-02603

**HANDLING DISCHARGES FROM WASTE OIL PROCESSING,**
Recon Systems, Inc., Princeton, N.J.
N. J. Weinstein, and R. M. Wolfertz.
Industrial Wastes, Vol 22, No 5, p 50-52, September/October, 1976. 2 fig, 4 tab.

Descriptors: *Oil industry, *Sludge disposal, *Waste water treatment, *Oil wastes, *Waste disposal, Recycling, Separation techniques, Neutralization, Lagoons, Landfills, Industrial wastes, Chemical wastes, Dissolved solids, Suspended solids, Phenols, Metals, Organic compounds, Byproducts.
Identifiers: Oil re-refining.

The treatment and disposal of sludges and waste waters generated during oil re-refining operations are reviewed. Acid sludge which contains metals, combustibles, and oil must be handled carefully because of its high acid content, and currently all acid sludge disposal by refineries in the United States is to landfills or lagoons, usually without neutralization. Spent clay is ordinarily disposed of to landfills, although some uses for it have been found, for example, unpaved road stabilization. Other wastes such as filter and centrifuge sludges, tank cleaning sludges, furnace coke, combustion ash, waste water flocs, and scums are normally disposed of with refuse or separately landfilled, although oil recovery by dewatering and blending may be practices on some tank sludges. Distillation bottoms are either stored in lagoons or used as an asphalt blending stock. Oil/water separation and neutralization are used to treat process waste water, and cooling water is sometimes recycled or occasionally joined to other waste streams entering an oil/water separator. Waste water from oil re-refining operations generally contains traces of metals, dissolved and suspended solids, dissolved phenols, and other organics. (Kreager-FIRL)
W77-02604

**POLLUTION CONTROL IN INDIAN STEEL INDUSTRY,**
Regional Engineering Coll., Rourkela (India). Dept. of Metallurgical Engineering.

For primary bibliographic entry see Field 5B.
W77-02605

**CHEMICAL PULPING,**
For primary bibliographic entry see Field 5B.
W77-02606

**BIOLOGICAL PROCESS FOR EFFLUENT AND WASTE TREATMENT AS APPLIED IN THE PAPER INDUSTRY,**
B. Morgeli, and J. Gnieser.
Sulzer Technical Review, Vol. 58, No. 2, p 85-88, 1976. 6 fig, 1 tab, 10 ref.

Descriptors: *Pulp and paper industry, *Biological treatment, *Activated sludge, *Pulp wastes, *Waste water treatment, Industrial wastes, Microorganisms, Biodegradation, Aeration, Liquid wastes, Recycling.

The use of biological treatment for purifying liquid wastes generated by the pulp and paper industry is discussed. A biological treatment process which is capable of accommodating operational disturbances and variations in the quality and quantity of the waste to be treated is outlined and involves the use of activated sludge treatment with sludge reaeration. Return sludge for the biological treatment is prepared in a separate sludge tank in which the microorganisms that are grown in the activation tank remain alive for longer periods of time. The return sludge can thus not only be supplied to the process in metered quantities but can also be altered in terms of microorganism activity. (Kreager-FIRL)
W77-02607

**ADVANCED TREATMENT OF PULP WASTE WATER (PARAPU HAISUI NO KODO SHORI),**
M. Koseki, and N. Mimoto.
Sumitomo Jukikai Giho (Sumitomo Shipbuilding and Machinery), Vol. 24, No. 71, p 88-92, August, 1976. 12 fig, 4 tab, 5 ref.

Descriptors: Pulp and paper industry, *Activated sludge, *Waste water treatment, *Adsorption, *Coagulation, Activated carbon, Sedimentation, Biological treatment, *Pulp wastes, Chemical wastes, Industrial wastes, Liquid wastes, Evaluation, Performance.

Activated sludge treatment of pulp waste water was evaluated. Activated sludge treatment not only improved water quality but also permitted a large reduction in the chemical dosage required for subsequent coagulation-sedimentation. Activated sludge treatment also permitted greater adsorption of pollutants during activated carbon treatment. Chemical oxygen demands of less than 200 milligrams/liter appear to be attainable by using a combination of activated sludge, coagulation-sedimentation, and activated carbon adsorption treatment. (Kreager-FIRL)
W77-02608

**SOME INTERNAL MEASURES FOR THE REDUCTION OF THE EFFLUENT LOAD SHOWN BY THE EXAMPLE OF A CALCIUM-BISULPHITE PULPMILL (EINIGEINNERBETRIEBLICHE MASSNAHMEN ZUR VERMINDERUNG DER VERFLUTERBELASTUNG, DARGESTELLT AM BEISPIEL EINER CALCIUMBISULFITFABRIK),**
J. P. Franzreb.
Das Papier, Vol. 30, No. 9, p 384-389, September, 1976. 6 fig, 4 ref.

Descriptors: Pulp and paper industry, *Waste water treatment, *Sulfite liquors, *Pulp wastes, *Bleaching wastes, Effluents.

A number of different measures are proposed for the reduction of effluent load at a calcium bisulphite pulpmill. First is the collection of at least 98% of the digester waste liquor. A combination of diffusion and filter washing with effluent-free closed separation has proved effective for fir and beech wood. The success of such an operation depends on the exclusion of uncontrolled accidental losses. Three groups of damaging materials are distinguished which can lead to secondary contamination as evaporation condensates; the problem of their reduction is discussed. From 70-90% of effluent contamination by bleaching plant effluents result from the chlorination and/or alkaline extraction step. Measures to eliminate this are described. (Miller-FIRL)
W77-02609

**WASTE TREATMENT ADVANCES: WASTE WATER TREATMENT VIA ACTIVATED CARBON,**
Calgon Corp., Pittsburgh, Pa.
D. G. Hager.
Chemical Engineering Progress, Vol. 72, No. 10, p 57-60, October, 1976. 5 tab, 7 ref.

Descriptors: *Activated carbon, *Adsorption, *Textiles, *Waste water treatment, *Treatment facilities, Color, Carbon, Organic compounds, Phenols, Efficiencies, Performance, Evaluation, Chemical wastes, Industrial wastes.
Identifiers: Textile industry.

The effectiveness of activated carbon adsorption in reducing total organic carbon, color, and phenol was evaluated for 107 industrial waste water samples, including 16 samples from the textile industry. Total organic carbon removals of greater than 85% were observed in 79 out of 102 samples; 95% color removal was observed in 16 out of 16 samples, and 99% phenol removal was achieved in 5 out of 5 samples. A total of 15 full-scale industrial adsorption systems have been placed in operation throughout the United States since 1973 to treat a variety of dissolved organic contaminants. Flows range from 6000 to more than 1 million gallons/day, with carbon contact times ranging from 8 min to about 23 hr. All of the plants rely on off-site carbon reactivation. (Kreager-FIRL)
W77-02610

**QUEBEC ENVIRONMENTAL REGULATIONS IN THE TEXTILE INDUSTRY...AND ONE COMPANY'S SOLUTION,**
For primary bibliographic entry see Field 5G.
W77-02611

**TREATING EFFLUENT CONTAINING COMPOUNDS PREF. DYES - BY ADDING SALT GENERATOR OF OPPOSITE CHARGE TO EFFLUENT ION THEN ULTRA-FILTERING.**
Belgian Patent BE-838-926. Issued August 25, 1976. Derwent Belgian Patents Abstracts, Vol. X, No. 37, p D2, October 10, 1976.

Descriptors: *Patents, *Tannery wastes, *Waste water treatment, *Filration, *Separation, Chemical reactions, Ions, Salts, Industrial wastes, Chemical wastes, Membranes, Pressure.
Identifiers: Tanneries, Ultrafiltration, Salt formation.

A patent for a process that removes water-soluble ionic compounds from tanning effluents is described. The process involves the addition of a water-soluble salt generator which carries a charge that is opposite that on the ionic compound to be removed. This salt generating compound is prefereably of high molecular weight. After salt formation, the effluent is subjected to ultrafiltration under pressure. High flow rates can be obtained with the method, and a semi-permeable membrane which would be unsuitable for filtering the untreated effluent may be used to filter the treated effluent. (Kreager-FIRL)
W77-02612

**AIR AND WATER PURIFICATION - WITH ACID CHLORITE SOLUTION.**
German Patent DS 2223-790. Issued August 26, 1976. Derwent German Patents Abstracts, Vol. X, No. 36, p D2, October 13, 1976.

Descriptors: *Patents, *Tannery wastes, *Air pollution, *Waste water treatment, *Industrial wastes, Pollution abatement, Gases, Liquid wastes, Nitrogen compounds, Sulfur compounds, Hydrogen sulfide, Alcohols, Organic acids, Acidity, Chemical reactions.
Identifiers: Mercaptans, Fatty acids.

A patent for a tanning waste purification process is described. Both waste gases and waste waters containing alcohols, aldehydes, fatty acids, and sulfur and nitrogen-containing compounds like hydrogen sulfide, mercaptans, and tryptophane are purified by treatment with alkali or alkaline earth chlorites in an acid medium at a pH of less than 6 and a temperature of 80 C. The process results in the formation of nontoxic products in an inexpensive manner and without the risk of explosion. (Kreager-FIRL)
W77-02613

**LEATHER INDUSTRY EFFLUENT PURIFICATION - BY ACIDIFICATION PRIOR TO LIME TREATMENT AND SEPARATION BY FLOTATION.**
Soviet Patent SU-487-024. Issued February 23, 1976. Derwent Soviet Inventions Illustrated, Vol. X, No. 35, p D4, October 6, 1976.

Descriptors: *Patents, *Tannery wastes, *Waste water treatment, *Lime, *Flotation, *Separation techniques, Chromium, Proteins, Suspended solids, Chemical wastes, Industrial wastes, Liquid wastes, Acidity, Alkalinity.
Identifiers: Tanneries, Leather industry.

A patent for a tannery effluent purification process is described. The process involves a lime treatment and pressure flotation separation. Protein, chromium compounds, and suspended solids are better removed by prior acidification of the effluent to a pH of 4.5. After this initial step, the deposit is removed in a flotation tank, and the pH of the effluent is adjusted to 7.5-8.0 with lime. Final separation is achieved by pressure flotation. (Kreager-FIRL)
W77-02614

**THE PURIFICATION OF INDUSTRIAL EFFLUENT.**
Australian Patent 473,544. Issued June 24, 1976. The Australian Official Journal of Patents, Trade Marks, and Designs, Vol. 46, No. 22, p 2192, June 24, 1976.

Descriptors: *Tannery wastes, *Waste water treatment, *Patents, *Flocculation, *Industrial wastes, Liquid wastes, Chemical wastes, Chemical properties.
Identifiers: Tanneries.

A patent for a flocculant compostion that may be used for purifying effluents from tanneries, textile plants, paper mills, and dyestuff or optical brightener manufacturing processes is described. The flocculant composition consists of a condensation product of dicyandiamide or dicyandiamidine, formaldehyde, and an alkylenepolyamine having two to eight carbon atoms. (Kreager-FIRL)
W77-02615

**MUNICIPAL WASTEWATER RECYCLING: A STRATEGY FOR MEETING THE ZERO DISCHARGE GOAL OF PL 92-500,**
California Univ., Los Angeles. School of Architecture and Urban Planning.
A. Herson.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 912, Price codes: A07 in paper copy, A01 in microfiche. February 1976. (California Water Resources Center Project UCAL-WRC-W-503).

Descriptors: *Waste water treatment, *Water reuse, *Recycling, *Municipal wastes, Federal Water Pollution Control Act, Irrigation.
Identifiers: *Zero discharge, *Federal Water Pollution Control Act Amendments(1972).

Several factors are responsible for increased interest in reusing municipal wastewater during the last few years. First, in many areas of the country, water--particularly for irrigation--is in short supply. Second, advances in wastewater engineering have made possible higher efficiencies in the removal of pollutants from municipal effluent. Third, concern about the quality of man's environment in general, and concern about the quality of the nation's water resources, in particular, have been increasing. The increased emphasis on environmental quality has led to new national laws, the most important of which, in the context of wastewater reuse, is the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500). The relationship between this far reaching law and the implementation of wastewater reuse projects is reviewed. (Snyder-California, Davis)
W77-02620

**IMPROVING DESIGN CRITERIA FOR SEPTIC TANK SYSTEMS,**
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
D. Mitchell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 006, Price codes: A03 in paper copy, A01 in microfiche. Arkansas Water Resources Research Center, Fayetteville, Publication No. 42, August 1976. 41 p, 24 fig, 2 tab. OWRT A-027-ARK(1).

Descriptors: *Septic tanks, Percolation, *Design criteria, *Waste water treatment, Water pollution sources.
Identifiers: *Absorption field design(Septic tanks).

The purpose is to determine the biodegradation capacity of various sizes and depths of washed river gravel. The results of the laboratory analysis of influent and effluent wastewater are discussed as they relate to the establishment of the most efficient biodegradation size and depth of the column. The biodegradation capacity of each lysimeter was evaluated in terms of COD removal, total inorganic nitrogen removal and phosphate removal in relation to dosage rates, loading rates and pH. In lysimeters containing river gravel passing a 3/8 inch sieve, degradation as measured by COD, phosphate and nitrogen removal varied directly with increasing depth. A higher degradation efficiency was achieved in lysimeters containing river gravel passing a number 4 sieve. The variation in COD removal in lysimeters of increasing depth is less pronounced for the fine material. The significantly higher removal in lysimetcr 3 with a Cu of 30 and D10 of 0.4 mm. compared to lysimeter 11 of identical depth and material passing a 1/2 inch sieve but having a Cu of 3.3 and a D10 of 4.2 mm. emphasize the importance of soil characteristics on waste absorption. An absorption field with an addition of twelve inches of gravel passing a number 4 sieve with a Cu of 30 and a D10 of 0.4 mm., would provide COD removal of 90% or above at minimum dosage rates calculated according to Bulletin No. 9 by the Arkansas State Department of Health.
W77-02621

**A STATEMENT OF CONCERNS AND SUGGESTED ECOLOGICAL RESEARCH, REPORT NUMBER 1 OF THE LAKE MICHIGAN COOLING WATER STUDIES PANEL.**
Lake Michigan Cooling Water Studies Panel, Chicago, Ill.
For primary bibliographic entry see Field 5C.
W77-02636

**ECONOMIC MODELS OF WASTER USE, (RANN UTILIZATION EXPERIENCE, CASE STUDY NUMBER 4),**
Houston Univ., Tex.
For primary bibliographic entry see Field 6C.
W77-02640

**TWO DEVICES FOR REMOVING SUPERSATURATING GASES IN AQUARIUM SYSTEMS,**
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 5G.
W77-02706

**REMOVAL OF TOXIC CHEMICALS FROM WATER WITH ACTIVATED CARBON,**
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
U. K. Dawson, L. L. Marking, and T. D. Bills.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 119-123, 1976. 2 tab., 23 ref.

Descriptors: *Hydrogen ion concentration, *Waste water treatment, *Adsorption, *Toxins, *Piscicides, Pesticides, Water purification, *Filtration, *Pesticide removal, *Temperature, *Activated carbon, *Carbon filters, Chemicals, Pollution abatement, Impaired water quality, Equipment, Laboratory tests, Filters, Rotenone, Antimycin A.
Identifiers: Noxfish, Dibrom, Juglone, MS-222, Benzocaine.

Activated carbon was effective in removing fish toxicants and anesthetics from water solutions. Its capacity to adsorb 3-trifluoromethyl-4-nitrophenol (TFM), antimycin, Noxfish(R) (5% rotenone), Dibrom(R), juglone, MS-222, and benzocaine ranged from 0.1 to 64 mg per gram of carbon. The adsorptive capacity of activated carbon for removal of TFM was determined at several column depths, temperatures, pH's and flow rates. Adsorptive capacity increased when the contact time was increased by reducing the flow rate or increasing the column depth. The adsorptive capacity was not significantly influenced by temperature but was substantially higher at pH 6.5 than at higher pH's tested. A practical and efficient filter for purifying chemically treated water was developed. (Katz)
W77-02707

**PHOSPHORUS REMOVAL DEMONSTRATION STUDY USING FERRIC CHLORIDE AND ALUM AT C.F.B. UPLANDS,**
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
W. E. Stepko, and E. E. Shannon.
Technology Development Report EPS 4-WP-74-5, Environmental Protection Service, June, 1974, 63 p., 4 app., 9 fig., 18 tab, 10 ref.

Descriptors: *Waste water treatment, Sludge, Detergents, *Activated sludge, Suspended solids, Sewage treatment, Phosphorus, Aeration, *Canada.
Identifiers: *Phosphorus removal, *Ferric chloride, *Alum, Raw sewage, Aeration tanks, Aeration tank effluents, Raw waste waters, Clarification.

Full scale phosphorus removal studies were conducted on the activated sludge wastewater treatment plant at C.F.B. Uplands. Wastewater characteristics and treatment plant performance were closely monitored under baseline conditions (no chemical addition) and at various ferric chloride and alum addition levels. The addition of either alum at 17.5 mg/l as Al, or ferric chloride at 30 mg/l as Fe was capable of producing a secondary effluent averaging 1 mg/l total phosphorus. The phosphorus removal efficiency was greatly influenced by plant flow. Consistent removals were only obtained with flows at or below plant design, corresponding to secondary clarifier overflow rates of 700 Igal per sq. ft. or less. At flows greater than design, total phosphorus removals were affected by the excessive transport of solids over the secondary clarifier weir. Based upon the addition points (raw sewage, aeration tank or aeration tank effluent) evaluated, all locations were equally effective in removing filterable phosphorus. However, at flows greater than design, better overall phosphorus removals were achieved during the raw sewage (primary) additions. The effect of the 1973 Canadian laundry detergent reformulation upon reducing phosphorus loading to the treatment plant was observed. (Environment Canada)
W77-02738

**SELECTED REFERENCES ON PHOSPHORUS REMOVAL,**
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
B. P. LeClair.
Economic and Technical Review Report EPS 3-WP-73-2, Environmental Protection Service, February, 1973, 41p.

Descriptors: *Waste wate treatment, Publications, Phosphorus, Precipation, Nutrients, Bibliographies, Phosphates, Flocculation, Sludge, Microorganisms, Treatment facilities, Sewage effluents.
Identifiers: *Phosphorus removal.

This bibliography is intended to provide investigators interested in phosphorus removal with a comprehensive compilation of the literature. This literature survey is arranged in order of categories related either to the chemicals used for precipitation of, or process used for the removal of phosphorus. Two additional categories, one for patents issued for phosphorus removal processes, the other for dissertations related to phosphorus removal are also included. (Environment Canada)
W77-02740

**ADVANCED WASTEWATER TECHNOLOGY, A SELECTIVE CODED BIBLIOGRAPHY,**
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
M. F. D. Hamoda, E. E. Shannon, and N. W. Schmidtke.
Technical Appraisal Report EPS 3-WP-73-1, Environmental Protection Service, February, 1973, 132p.

Descriptors: *Waste water treatment, *Bibliographies, Sludge, Precipitation, Coagulation, Flocculation, Adsorption, Evaporation, Electrodialysis, Ion exchange, Waste disposal, Publications.

In the past decade, research in the area of advance wastewater treatment has proliferated with a resultant increase in the related literature. It has become increasingly difficult for pollution abatement specialists to keep ahead of recent developments. English language literature from 1965 to July 1972 is summarized. Items are listed by treatment process discussed. (Environment Canada)
W77-02741

**STORM WATER MANAGEMENT MODEL STUDY, VOLUME I.**
MacLaren (James F.) Ltd., Toronto (Ontario); and Proctor and Redfern, Toronto (Ontario).
For primary bibliographic entry see Field 5B.
W77-02743

**STORM WATER MANAGEMENT MODEL STUDY, VOLUME II.**
MacLaren (James F.) Ltd., Toronto (Ontario); and Proctor and Redfern, Toronto (Ontario).
For primary bibliographic entry see Field 5B.
W77-02744

**COMPUTER-AIDED PLANNING OF REGIONAL SLUDGE DISPOSAL SYSTEMS, USER'S MANUAL,**
B and P Engineers, Kitchener (Ontario).
F. J. Allan, P. L. Silveston, and W. L. Keay.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 46, Environmental Protection Service, Environment Canada, Ottawa, Canada, September 1976, 409p., 60 fig., 38 tab, 10 ref. 10 append. 73-5-8.

Descriptors: *Sludge disposal, Computers, *Planning, Costs, Publications, Administration, *Computer programs, Data collections, Lagoons, Landfills, Regional analysis, Model studies, Waste disposal, *Canada.
Identifiers: Niagara, Ontario, Land disposal.

This training manual introduces potential users to the concepts of computer-aided planning, the models for sludge disposal that are imbedded in the computer programs, and the information which must be developed in order to use the programs. It is a source book for setting up a data collection program to be used with computer-aided planning. It contains the coding which transforms the data into the proper form for processing by a computer. Detailed information is provided on the structure of the computer program, so that it can be modified for special purposes or expanded to handle different planning problems such as refuse disposal. A general purpose computer program applicable to the optimization or regional sludge disposal systems is described. The model upon which the computer program is built is a network of transport routes connecting nodes which represent sources of sewage sludge, intermediate facilities for processing or the temporary storage of sludge (such as vacuum filters or lagoons), and dead-end facilities for ultimate disposal (such as landfill or land spreading sites). (Environment Canada)
W77-02745

**EFFECT OF STORAGE ON STORM AND COMBINED SEWERS,**
Toronto Univ. (Ontario). Dept. of Civil Engineering.
J. G. Henry, and P. A. Ahern.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 34, Environmental Protection Service, Environment Canada, Ottawa, Canada, February 1976, 106p., 27 fig., 19 tab, 27 ref, 2 append. 74-8-1.

Descriptors: *Storage, *Water storage, *Roofs, *Sewers, Storm runoff, Reservoir storage, Costs, Alternative planning, Storm drains, Storm water, *Canada, *Combined sewers, Watershed(Basins).
Identifiers: *Roof ponding, Ontario.

The effect of storage on storm and combined sewers has been investigated for residential subdivision of approximately 100 acres area, under development in Southern Ontario. The storage methods examined were: ponding of rainfall on flat roofs; on-side storage of roof runoff; storage of flows from street gutters at catch basins; and holding reservoirs as part of the sewer network. A hydrograph model for estimating stormwater runoff from residential areas has been developed and incorporated in a computer program. The model was used to determine the outflow hydrograph at the storm sewer outfall from the subdivision for a synthetic two-year design storm. An alternative design, replacing the separate sanitary and storm sewers by combined sewers, was carried out and the outflow hydrograph from a combined sewer network was determined. The effects of different storage methods on the outflow hydrograph were tested for both the separate and combined systems. Substantial reductions in peak flow were found to occur as the level of storage was increased, with holding reservoirs providing the greatest reductions. Cost data from the original separate system design was used to calibrate formulae for estimating sewer pipe costs. The total costs of systems incorporating various storage options were compared. A combined sewer system was found to be slightly less expensive than the separate system and small savings in subdivision sewer costs resulted when storage was incorporated. (Environment Canada)
W77-02746

**DIRECT PHYSICOCHEMICAL TREATMENT WITH OZONE,**
Sherbrooke Univ. (Quebec). Dept. of Chemical Engineering.
J. P. Jones, and J. Dufort.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 32, Environmental Protection Service, Environment Canada, Ottawa, Canada, February 1976, 59p., 21 fig., 5 tab, 9 ref, 3 append. 72-5-16.

Descriptors: *Ozone, *Waste water treatment, *Chemicals, Biochemical oxygen demand, Efficiencies, Suspended solids, *Filtration, *Filters.
Identifiers: Clarification unit, Chemical clarification, Sand filtration, Dual media filters.

A pilot study of direct physicochemical treatment of wastewaters using ozone is described. The pilot plant consisted of three principal elements: a chemical clarification unit, an ozone contact section, and a dual media filter. The chemical clarification unit removed up to 95% of the suspended solids in the raw sewage food. The ozone contact section consisted of four spray contactors. These were generally sufficient to reduce the soluble BOD5 by 40%. The filter served to polish the effluent by removing the last traces of suspended solids. The amount of ozone needed to reduce the BOD5 and the TOD in the effluent of a chemical clarification unit to acceptable levels has been studied. The amount was found to depend principally on the initial TOD and to be a weaker function of other variables. The stoichiometric efficiency of ozone was increased by providing holding time between contactors. Treatment with eight ozone contact stages resulted in an effluent with a BOD5 of 16 mg/l. A comparative economic study was made of direct physicochemical treatment with activated carbon. The cost of the ozone process was 17% higher. However, credit was not allowed for the disinfection and aeration which occurred during ozonation. (Environment Canada)
W77-02747

**PHOSPHORUS REMOVAL WITHIN EXISTING WASTEWATER TREATMENT FACILITIES,**
Ontario Ministry of the Environment (Toronto)
B. I. Boyko, and J. W. G. Rupke.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 44, Environment Protection Service, Environment Canada, Ottawa, Canada, August 1976, 43p., 9 fig., 5 tab, 26 ref. 71-1-1.

Descriptors: *Phosphorus, *Water pollution control, *Treatment facilities, Waste water treatment, Coagulation, Costs, Effluents, Chemicals, Ponds, Anaerobic digestion, Sewage, *Canada.
Identifiers: *Phosphorus removal, *Ontario.

Various projects were undertaken to assist in the implementation of the Province of Ontario's phosphorus control program. Under this five-year program, phosphorus removal was to be initiated on the discharges of more than 170 existing wastewater treatment plants serving some five million persons. In order to implement this program, a methodology to predict the coagulant best suited for phosphorus removal at any particular treatment facility was required. It was also necessary to determine whether the chemicals used for phosphorus removal would have any physical or process effects on present wastewater treatment processes, facilities, methods of sludge treatment, and subsequent sludge disposal practices. This report discusses coagulation and prime coagulant selection, and the operational results problems and design considerations derived from a series of full scale studies. The study concluded that phosphorus removal may be readily implemented with minimal capital expenditure at operating municipal wastewater treatment facilities of all designs currently in use in Ontario. (Environment Canada)
W77-02748

**ANAEROBIC DIGESTION OF LIME SEWAGE SLUDGE,**
Ontario Ministry of the Environment, Toronto. Pollution Control Branch.
S. A. Black.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No 50, Environmental Protection Service, Environment Canada, Ottawa, Canada, 1976. 17 p, 1 fig, 1 tab, append. 71-1-18.

Descriptors: *Sludge, *Anaerobic digestion, *Lime, Sewage treatment, Treatment facilities, Phosphorus, Disposal, Land, Municipal wastes, Gases, Waste treatment, Canada.
Identifiers: Newmarket, Ontario.

This study, designed to assess the ability of the anaerobic digestion process to accept the sludge produced by the addition of hydrated lime to the raw sewage of a conventional activated sludge plant, was supported under the Canada-Ontario Agreement on Great Lakes Quality. The study was carried out in conjunction with full-scale phosphorus removal at the Newmarket 2.0 MIGD activated sludge plant. An intensive sampling program on the two-stage anaerobic digester carried out between March, 1972 and March, 1973 is described. The study determined that normal digester operation when receiving lime sewage sludge may be anticipated, but that care should be used to eliminate shock loading effects when starting up a digester on lime sewage sludge. (Environment Canada)
W77-02750

**EFFLUENT POLISHING BY FILTRATION THROUGH ACTIVATED ALUMINA, VOLUME II, (MARCH, 1975).**
Pollutech Pollution Advisory Services Ltd., Oakville (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 40, Environmental Protection Service, Environment Canada, Ottawa, Canada, April, 1976, 110p. 10 tab, 12 fig, 3 append. 73-5-4.

Descriptors: *Effluents, *Filtration, Water pollution control, Phosphorus, Lime, *Waste water treatment, Sewage, Costs, Municipal wastes, Canada, Treatment facilities.
Identifiers: *Effluent polishing, *Activated alumina columns, Waterloo, Ontario, Sodium hydroxide.

Chemically pretreated secondary effluent from the Waterloo Water Pollution Control Plant was polished in pilot scale activated alumina columns. Various regeneration modes for removal of phosphorus from the saturated alumina were investigated. The feasibility of lime treatment of the regenerant solutions to allow continued reuse of the caustic was evaluated. Capital and operating cost estimates were developed based on the findings of the study. All phases of the process, phosphorus adsorption, sodium hydroxide regeneration and lime precipitation were found to be technically feasible. The adsorptive capacity of fresh activated alumina was approximately 4.75 mg P/g A1203, but was significantly reduced after several saturation-regeneration cycles. Once through elution with 15 bed volumes of 1N NaOH was the most efficient regeneration mode. Continuous recirculation of small volumes of caustic did not improve the regeneration efficiency. Activated alumina losses during regeneration were minimal and did not account for the loss of adsorp-

tive capacity of the bed. Lime treatment of the regenerant solutions at a dosage of 8 g/l effectively removed the phosphorus to allow reuse of the sodium hydroxide solution. However, continued lime addition adversely affected the settling properties of the precipitate and further studies are required in this area. (See also W76-10491) (Environment Canada)
W77-02755

**LAND DISPOSAL OF SEWAGE SLUDGE, VOLUME III, APRIL 1974 - MARCH, 1975,**
Guelph Univ. (Ontario). Dept. of Microbiology; and Guelph Univ. (Ontario). Dept. of Land Resources Science.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 35, Environmental Protection Service, Environment Canada, Ottawa, Canada, February 1976, 282p., 11 fig., 226 tab. 72-5-17.

Descriptors: *Sewage sludge, *Sewage treatment, Land use, Hazards, Rates of application, Soils, Runoff, Heavy metals, Microbiology, Seasonal, Seepage, Phosphorus, Crop response, *Waste disposal, *Sewage disposal, Water reuse, Recycling.
Identifiers: *Land disposal, Soil characterization.

Described are runoff studies with fall, winter and spring applied sewage sludge, and field rate and source of sludge studies with bromegrass on a loam soil and with corn on a loam, a sandy loam and a clay loam soil. A greenhouse trial with different rates and sources of sludge on two soils at three pH levels is also reported. Fluid digested sewage sludges from calcium oxide treatment of Newmarket sewage, aluminum sulphate treatment of Kitchener sewage and ferric chloride treatment of North Toronto sewage were used. Chemical analyses of the sludge, soil nitrogen, crop yields and nutrient and metal content of crops are presented along with microbial studies of the sludge and the crops grown. detailed descriptions of the soils used are also presented. In runoff studies, losses of nitrogen and nutrients were low in 1974, lower than 1973. In the field, crops responded to sewage, responses being similar in most cases to those from chemical fertilizers. About twice as much nitrogen was required from sludges as from ammonium nitrate to produce a particular yield. At higher rates of sludge application, levels of nitrate toxic to animals were approached. Sludges increased sodium bicarbonate soluble ('plant available') phosphorus quite markedly, and this effect was greatest with calcium sludge. Cadmium, nickel and zinc concentrations in crops increased appreciably with additions of sludge high in metals. (Environment Canada)
W77-02756

**PILOT SCALE EVALUATION OF A PHYSICAL-CHEMICAL WASTEWATER TREATMENT SYSTEM FOR COMBINED SEWER OVERFLOWS.**
Pollutech Pollution Advisory Services Ltd., Oakville (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 36, Environmental Protection Service, Environment Canada, Ottawa, Canada, 1976, 96 p, 27 fig, 29 tab, 19 ref. 74-8-29.

Descriptors: *Waste water treatment, *Sewers, *Overflow, Storm water, Suspended solids, *Pilot plants, *Screens, Gravity, Separation techniques, Filters, Chemicals, Ozone, *Combined sewers, Treatment facilities.
Identifiers: Oakville, Ontario, Strainers, Microstrainer(R), *Ozonation.

A pilot scale investigation of the feasibility of using coarse screening, microscreening, and ozonation for the treatment of combined sewer overflows is described. The pilot scale system consisted of a Crane-Cochrane Microstrainer with 23 micron screen openings and an ozone generator. The dilute waste concentrations anticipated in combined sewer overflows were simulated by diluting raw sewage with tapwater. The contaminants measured were BOD, total organic carbon, suspended solids, total phosphorus, oil and grease, and total coliforms. The effects of waste strength and hydraulic loading were studied by varying the dilution of the raw waste and controlling the throughput of the unit. The contaminant removal efficiency decreased with the degree of dilution of the raw sewage, and the hydraulic loading on the Microstrainer increased. The effect of ferric chloride and polyelectrolyte chemical addition prior to microscreening was investigated, but no beneficial effect on the treatment efficiency was observed. Ozonation reduced the concentration of all measured contaminants including suspended solids. At a 20 mg/l ozone dosage in a continuous ozonation reactor with a nominal 15 minute retention time, COD removals of 40 to 50 percent were observed. Microscreened raw sewage spiked with lead to simulate street runoff showed a 35 percent reduction in lead concentration. The average removal efficiency of the pilot scale treatment system for all experimental conditions was 67% BOD5 removal, 40d% suspended solids removal, 26% total phosphorus removal, and greater than 99.9% total coliform reduction. (Environment Canada)
W77-02757

**REVIEW OF ENVIRONMENTAL CONTROL OF MERCURY IN JAPAN,**
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W77-02761

**MODIFICATION OF THE TRADITIONAL SEQUENCE FOR THE TREATMENT OF WASTEWATERS FROM METAL FINISHING INSTALLATIONS,**
Environmental Protection Service, Ottawa (Ontario).
L. Buffa.
(Water Pollution Control Directorate) Economic and Technical Review Report, July 1976, 12p., 3 fig, append.

Descriptors: *Waste water treatment, *Metals, *Heavy metals, Separation techniques, Effluents, Regulation, Chemical precipitation.
Identifiers: *Metal finishing plants, *Cyanides, Precipitation(Treatment), Clarification, Chemical treatment.

This analysis was initiated as an attempt to define the effect a controlled amount of dilution water would have on the amount of contaminats discharged from metal finishing operations and their concentrations. A simplified 'traditional' chemical treatment system has been used as a model to arrive at a relationship between quantity and concentration of a given contaminant, and the ratio volume of treated process water to volume of dilution water. This relationship has been used to discuss a modified treatment system applicable to wastewater from metal finishing installations. (Environment Canada)
W77-02762

**REMOVAL AND RECOVERY OF METALS FROM SLUDGE AND SLUDGE INCINERATOR ASH,**
Canada Centre for Inland Waters, Burlington (Ontario).
B. G. Oliver, and J. H. Carey.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 33, Environmental Protection Service, February 1976, 58p., 16 fig., 22 tab, 31 ref. 74-3-15

Descriptors: *Sludge treatment, *Heavy metals, Copper, Zinc, Nickel, Cadmium, Trace elements, Temperature, Costs, Sludge digestion, Phosphates, Aqueous solutions, Electrodes, Electrochemistry, *Waste water treatment, Recycling.
Identifiers: *Sludge incinerator ash, Sulphuric acid, Copper struck graphite and aluminum electrodes, *Metal recovery, *Metals removal.

The electrochemical plating of Cu, Zn, Ni and Cd from aqueous solutions has been studied using standard plate type electrodes and improved efficiencies were attained with fluidized bed electrodes. Because direct electroplating from sludge was inefficient, acid and base additions were made to solubilize the metals prior to plating. Most of the metals and phosphorus in the digested sludge could be dissolved by adding sufficient H2SO4 or HC1 to lower the sludge pH to 1.5. The average cost of acid required per ton of dry solids was $41 for the H2SO4 and $77 for HC1. Little economic advantage would be gained by recovering sludge constituents, since processing costs for the large volumes of dilute leachate would be high. The metals and phosphorus in sludge incinerator ash can be solubilized with H2SO4 in a countercurrent stepwise process which uses most of the acid. Further processing of the H2SO4 leachate for recovery of valuable constituents is complicated by the presence of large quantities of iron in the leachate. Neutralization of the leachate with NaOH precipitates all the metals and phosphorus. Treating this precipitate with a hot NH4OH - (NH4) 2SO4 mixture resolubilizes most of the trace metals and phosphorus leaving iron oxide in the solid phase. Electroplating can remove Cu, Zn, Ni and Cd from the ammonia leach, and ammonium phosphate can be recovered from the solution after electrolysis. While processing costs for incinerator ash are much less than those for wet sludge, the procedure does not appear to be economically viable except for very large treatment plants. (Environment Canada)
W77-02763

**PRACTICES, POLICIES AND TECHNOLOGY OF STORM AND COMBINED SEWERS IN FOREIGN COUNTRIES.**
Albery, Pullerits, Dickenson and Associates Ltd., Don Mills (Ontario).
For primary bibliographic entry see Field 5G.
W77-02767

**POLYCHLORINATED BIPHENYLS (PCB'S) IN MUNICIPAL WASTEWATERS: AN ASSESSMENT OF THE PROBLEM IN THE CANADIAN LOWER GREAT LAKES,**
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
For primary bibliographic entry see Field 5A.
W77-02768

**CHROMIUM RECOVERY FROM SLUDGES PRODUCED FROM CHROMATE-INHIBITED COOLING WATER,**
Goodyear Atomic Corp., Piketon, Ohio, Process Technology Dept.
L. E. Deacon, M. E. Holland, and R. I. Kaplan.
(1975). 16 p, 4 tab, 4 fig, 6 ref.

Descriptors: *Waste water treatment, *Cooling water, *Chromium, Chemical wastes, Water pollution sources, Water chemistry, Separation technique.
Identifiers: *Calcination.

The technical feasibility of recovering chromium values from sludge produced when recirculating cooling water is treated to remove toxic hexavalent chromium before discharge is demonstrated. The most successful approach involved calcination of the sludge with added soda ash at 850-900C for about 30 minutes in an open-air calciner. 75% recovery yields were recorded. The process converts the chromium to water-leachable sodium chromate. (Chilton-ORNL)
W77-02874

**SILICA IN WATER IN RELATION TO COOLING TOWER OPERATION,**
Los Alamos Scientific Lab., N. Mex.
C. Wohlberg, and J. R. Buchholz.
Report LA-UR-74-1895, 56 p, 17 fig, 51 ref, append. International Corrosion Forum Devoted Exclusively to the Protection and Performance of Materials, Toronto, Ontario, Canada, April 14-18, 1975. W-7405-Eng-36.

Descriptors: *Water purification, *Cooling water, *Cooling towers, *Silica, Chemistry, Separation techniques, Water pollution, Heat transfer, *Waste water treatment.

Evaporation of cooling tower water concentrates the initial silica content of the water and causes it to precipitate on heat-exchanger surfaces, thus interfering with heat transfer. It was concluded that the solubility of silica is a function of the species with which it is in equilibrium. The data cited indicate that magnesium and aluminum ions play a large role in natural systems in removing silica from water. These ions probably also have a large role in the deposition of silica in heat exchangers and have been the basis for some commercial methods of SiO2 removal from water. (Chilton-ORNL)
W77-02875

**CHEMICAL COMPOSITION AND METHODS FOR PURIFYING PHENOLIC WASTE WATERS RESULTING FROM RAPID THERMOLYSIS OF LIGNITES OF THE IRSHA-BORODINO AND MOSCOW REGIONS,**
Kaliniskii Politekhnicheskii Institut (USSR).
L. I. Volkova, A. M. Kunin, N. N. Amagaeva, G. V. Nenast'eva, and A. Y. Tkachenko.
ORNL-tr-2944, p 20-25, 1 tab, 5 ref. Translated from Trudy Kalininskogo Politekhnicheskogo Instututa, Moscow, Vol 13, 1972.

Descriptors: *Water pollution, Waste water(Pollution), Water quality, Chemical wastes, *Phenols, Chemistry, Coals, Lignite, *Water purification, *Waste water treatment, Industrial wastes.

The paper reports on the possibility of dephenolizing waste waters from the rapid thermolysis process by an extraction method as follows: the tar water solution, after preliminary filtration and neutralization, is extracted with butyl acetate with a total solvent consumption of 20% of the water volume, at 20-22C and with a standing time of 60 min. Data showed that water from the non-pyrolysis regime has an extraction coefficient for total phenols of 64-73%, for nonvolatiles of 49.5-63.2% and for volatiles of 94.9-96.5%. In the extraction of phenolic waters obtained in the process with additional pyrolysis, there is a higher extraction coefficient for total phenols(87-90%) but near the same extraction coefficient for volatiles and nonvolatiles. It was concluded that tar water obtained in rapid thermolysis decomposition of tar water and Irsha-Borodino brown coals have a complex chemical composition and are difficult to purify. (Chilton-ORNL)
W77-02993

**MEASURES TO COUNTERACT DAILY WATER POLLUTION: DEVELOPMENT TENDENCIES IN USA, (IN SWEDISH),**
Swedish Council for Building Research, Stockholm.
G. Svensson.
Vatten 31(3), p 198-212, 1975.

Descriptors: *Sewage disposal, *Sewage treatment, *Sewerage, *Mathematical models, *Cost analysis, *Urban runoff, *Combined sewers, Planning, Runoff, Waste storage, Rainfall-runoff relationships, Separated sewers, Biodegradation, Chemical degradation, *United States.
Identifiers: Sweden, Denver, Chicago, Washington(D.C.).

USA work on sewage disposal problems is reviewed to determine the best and cheapest solution applicable in Sweden, particularly with the problems of overloading caused by severe rainfall. Whether a combined sewage system or the most costly separate sanitary sewers should be used is discussed. Experience in Denver, Colorado, Chicago, Illinois and Washington, D. C. is described. Mathematical models and cost estimates for different schemes in other cities are presented. Emergency plans for Washington involve systems combining biological and chemical purification of sewage capable of dealing with large volumes of dirty runoff water. A combined sewage system including an overflow storage space can cope with most Swedish problems with cost savings provided there is a combined network of sewage mains.
W77-03035

**RECOVERY OF POLLUTED LAKES; A SWEDISH RESEARCH PROGRAM ON THE EFFECTS OF ADVANCED WASTEWATER TREATMENT AND SEWAGE DIVERSION: 7. DIFFUSE MUNICIPAL POLLUTION: EXAMPLES FROM THE TOWNS OF MOTALA AND UPPSALA, (IN SWEDISH),**
Uppsala Kommun Naturvardsverkets RR-Undersokning (Sweden). Algtestlab. Fysiol. Bot.
P. Wenster, S. O. Ryding, and C. Forsberg.
Vatten 31(3), p 274-285, 1975.

Descriptors: *Water pollution, *Waste water treatment, *Sewage treatment, *Sewage effluents, *Nutrient removal, *Urban runoff, Lakes, Water pollution treatment, Phosphorus, Storm water, Waste water(Pollution), Water pollution sources.
Identifiers: Diversoni, Motala, Lake, Recovery, Sweden, Uppsala, Polluted Lakes.

The building of advanced wastewater treatment plants resulted in a lower P content in sewage effluent. In addition to the pollution from the treatment plants, diffuse municipal loading (urban storm water and wastewater) adds nutrients to the wastewater receiving waters. When studying the recovery of polluted lakes, it is essential to quantify the total transport of nutrients. The quality of urban storm water from areas of different structure and the yearly amount of pollution originating from diffuse sources in Motala and Uppsala (Sweden) were studied. Great amounts of diffuse pollution in relation to sewage effluents were found. For an optimal water-control program effort should be made to minimize diffuse pollution sources.
W77-03057

## 5E. Ultimate Disposal Of Wastes

**INCINERATION OF INDUSTRIAL WASTES,**
Minnesota Mining and Mfg. Co., St. Paul.
C. R. Lewis, R. E. Edwards, and M. A. Santoro.
Chemical Engineering/Deskbook Issue, Vol. 83, No. 22, p 115-121, October 18, 1976. 2 fig.

Descriptors: *Chemical industry, *Incineration, *Air pollution, *Waste water treatment, *Treatment facilities, Chemical wastes, Industrial wastes, Neutralization, Chemical reactions, Sedimentation, Heat transfer.
Identifiers: Wet scrubbing.

An incineration facility for destroying toxic chemical wastes is described. The heart of the system is a 23,000-kilocalorie/hr rotary kiln incinerator which is used for the disposal of solvent-contaminated wastes. The purpose of incineration is to produce stable oxides that can be returned to the environment without causing detrimental effects. Satisfactory combustion in the primary and secondary chambers of the incinerator is the key to air pollution control; however, the incinerator is also outfitted with a wet scrubber system. The scrubber system consists of five major components: a quench chamber, a venturi scrubber, a mist separator, an induced-draft fan, and a 200-foot stack which acts like a reflux condenser. The scrubber effluent is subject to acid neutralization, chemical treatment, and sedimentation before it is discharged to the receiving stream. Pilot studies involving attempts to recover heat from the incinerator in the form of steam indicate that such recovery is not economically attractive because of the sizable distribution system required. (Kreager-FIRL)
W77-02596

**SYNCRUDE VOWS ENVIRONMENTAL RESPONSIBILITY,**
Syncrude Canada Ltd., Edmonton (Alberta).
For primary bibliographic entry see Field 5D.
W77-02600

**HANDLING DISCHARGES FROM WASTE OIL PROCESSING,**
Recon Systems, Inc., Princeton, N.J.
For primary bibliographic entry see Field 5D.
W77-02604

**SUMMARY OF GROUND-WATER QUALITY IMPACTS OF URANIUM MINING AND MILLING IN THE GRANTS MINERAL BELT, NEW MEXICO,**
Office of Radiation Programs, Las Vegas, Nev.
For primary bibliographic entry see Field 5B.
W77-02648

**HISTORY OF OCEAN DUMPING IN THE GULF OF MEXICO,**
Texas A and M Univ., College Station. Dept. of Civil Engineering.
R. W. Hann, Jr, T. F. Zapatka, M. C. Zapatka, and C. Baskin.
Sea Grant Program Report No. TAMU-SG-77-201, October 1976. 96 p, 12 fig, 5 tab, 31 ref. SG 04-6-158-44012.

Descriptors: *Gulf of Mexico, *Waste disposal, *Permits, Sewage disposal, Sludge disposal, Public rights, Oceanography, History.
Identifiers: *Ocean dumping, *Public Law.

A historical look at the practice of ocean dumping in the Gulf of Mexico is presented. The past and present ocean disposal practice in the Gulf of Mexico is documented. The Gulf of Mexico is defined with respect to physical, chemical, and biological characteristics. The currents, temperatures, and salinities are reported as well as a list of major river systems that drain into the Gulf. The economic importance with respect to fisheries, and oil and gas reserves is discussed. The report is divided into tow sections: the Corps of Engineers permitting system, and the EPA permitting system. Some information is included on who is known to have been dumping and what they have dumped, and when the dumping took place. Under the EPA permitting system, there is much more information concerning dumping. Excerpts from the Marine Protection, Research and Sanctuaries Act of 1973, which defines the national policy toward ocean dumping, are given as well as the types of permits issued under this law. Actual permits issued by the EPA were obtained from the regional office in Dallas, Texas and reviewed. A summary of each permit was made and presented. A short section discussed the more commonly used methods of discharging wastes from vessels such as jet-dispersion, hopper-barge, wake mixing, and container discharge. (NOAA)
W77-02668

**ABSTRACTS. SPECIAL SYNPOSIUM - THE MIDDLE ATLANTIC CONTINENTAL SHELF AND NEW YORK BIGHT,**
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5C.

W77-02678

**EFFECTS OF BALED SOLID WASTE DISPOSAL IN THE MARINE ENVIRONMENT--A DESCRIPTIVE MODEL,**
New Hampshire Univ., Durham. Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W77-02683

**COMPUTER-AIDED PLANNING OF REGIONAL SLUDGE DISPOSAL SYSTEMS, USER'S MANUAL,**
B and P Engineers, Kitchener (Ontario).
For primary bibliographic entry see Field 5D.
W77-02745

**LAND DISPOSAL OF SEWAGE SLUDGE, VOLUME III, APRIL 1974 - MARCH, 1975,**
Guelph Univ. (Ontario). Dept. of Microbiology; and Guelph Univ. (Ontario). Dept. of Land Resources Science.
For primary bibliographic entry see Field 5D.
W77-02756

**CONTROLLED COMBUSTION TESTS CARRIED OUT NEAR RIMOUSKI,**
Sherbrooke Univ. (Quebec). Dept. of Chemical Engineering.
B. Coupal.
Technology Development Report EPS-4-EC-76-2, Environmental Protection Service, Ottawa, Canada, March 1976, 15p., 4 fig., 2 tab.

Descriptors: *Oil spills, *St. Lawrence River, Testing, Tides, Ice, Burning, Efficiencies, Waste disposal, Oil wastes, Oil pollution, Water pollution control.
Identifiers: *Combustion, Crude oil, Bunker C oil.

Six combustion tests were performed on oil. Ceuta crude oil and Bunker C Oil were burned both on water and on ice. The burning of these oils was effected by using peat moss as a wicking agent and diesel fuel as a promoter. Combustion efficiencies on the order of 85 percent were attained. This combustion technique is a feasible method of disposing of oil spills. Recommendations are made for future research. (Environment Canada)
W77-02759

**CONTAMINANTS IN THE NEW YORK BIGHT,**
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Program.
For primary bibliographic entry see Field 5B.
W77-02799

**MEASURES TO COUNTERACT DAILY WATER POLLUTION: DEVELOPMENT TENDENCIES IN USA, (IN SWEDISH),**
Swedish Council for Building Research, Stockholm.
For primary bibliographic entry see Field 5D.
W77-03035

## 5F. Water Treatment and Quality Alteration

**CONTROL AND MONITOR INSTRUMENTATION FOR MUST WATER PROCESSING ELEMENT, FINAL REPORT,**
Life Systems, Inc., Cleveland, Ohio.
For primary bibliographic entry see Field 5A.
W77-02878

**EXPERIMENTAL, CLINICAL AND PHYSIOLOGICAL DATA FOR SUBSTANTIATING THE LOWER LIMITS OF THE MINERALIZATION OF DESALINATED DRINKING WATER, (IN RUSSIAN),**
Moskovskii Gosudarstvennyi Meditsinskii Institut (I).(USSR). Dept. of Public Hygiene.
For primary bibliographic entry see Field 5C.
W77-02895

**DRINKING WATER SUPPLY IN KRASNOVODSK, (IN RUSSIAN),**
Krasnovodsk Heat and Power Plant (USSR).
For primary bibliographic entry see Field 3A.
W77-02902

**PHYSIOLOGICAL ASSESSMENT OF CALCIUM CONTENT IN DISTILLED DRINKING WATER, (IN RUSSIAN),**
A. I. Bokina, V. K. Fadeeva, and E. M. Vikhrova.
Gig Sanit 11, p 14-17, 1975.

Descriptors: *Calcium, Rodents, *Desalination, Public health, *Potable water, Water treatment.
Identifiers: *Hypocalcemia.

The investigations were carried out on an experimental model of relative hypocalcemia in rats (on a Ca-rich diet). The hypocalcemia was compensated by water with a different Ca content at a level of 0.25, 50, 75, 100, 125 and 150 mg/l. The most adequate Ca content in desalinated drinking water was a level of 50-75 mg/l.--Copyright 1976, Biological Abstracts, Inc.
W77-02909

**STUDY OF THE EFFECT OF DESALTED DRINKING WATER ON THE HEALTH OF THE POPULATION, (IN RUSSIAN),**
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Public Hygiene.
A. I. Bokina, Yu. A. Rakhmanin, and V. P. Plugin.
Vestn Akad Med Nauk Sssr 3, p 41-46, 1975.

Descriptors: *Potable water, *Desalination, *Public health, *Investigations, Desalination plants, Water quality, Standards, Hardness(Water), Sulfates, Taste, *Water treatment.
Identifiers: Encephalogram, Kazakh-Ssr, Mineralization, Shevchenko, USSR, Caspian Sea.

The results are presented of clinical and physiological investigations of the population of the city of Shevchenko, a port city on the Capsian Sea in the Kazakh SSR (USSR), were desalted water has been used for drinking since 1968. The investigation is continuing, but for the present the following recommendations are given for large desalination plants: lower limit of mineralization, not less than 100 mg/1; permissible level of sulfates in the desalted water, not more than 250 mg/1; optimal level of mineralization on the basis of an EEG study of taste reactions, from 200-600 mg/1.
W77-03037

**FLUORINE IN DRINKING WATER OF EASTERN SLOVAKIA, (IN RUSSIAN),**
Univerzita Pavala Jozefa Safarika, Kosice (Czechoslovakia). Faculty of Medicine.
For primary bibliographic entry see Field 5A.
W77-03056

## 5G. Water Quality Control

**ENVIRONMENTAL OUTLOOK: WHERE WE STAND, WHAT'S AHEAD,**
G. W. Johnston.
Pulp and Paper, Vol 60, No 10, p 78-81, September, 1976.

Descriptors: *Water pollution control, *Air pollution, *Pulp and paper industry, Federal Water Pollution Control Act, Legislation, Odor, Pulp wastes.
Identifiers: Kraft mills, Closed systems.

In this interview, the status of the paper industry's pollution-control efforts and possible future developments are discussed via question and answer responses of Peter Wrist, vice president at Mead Carney International Company. Specifically, implications of the 1977 and 1983 goals of the Federal Water Pollution Control Act amendments are considered, together with the feasibility of completely closing the kraft pulp and paper processes and long-term solutions to the odor problems. (Sykes-IPC)
W77-02580

**WASTEWATER REQUIREMENTS MULTIPLY SOLIDS PROBLEMS,**
Texas Univ. at Dallas, Richardson.
J. G. Moore, Jr.
Hydrocarbon Processing, Vol. 55, No. 10, p 98-101, October, 1976. 4 fig, 2 tab, 5 ref.

Descriptors: *Oil industry, *Waste water treatment, *Solid wastes, *Waste disposal, *Economics, Sludge disposal, Industrial wastes, Incineration, Landfills, Farms, Regulation, Legal aspects.

The effect of increasingly stringent waste water requirements on solids disposal problems is discussed, with particular emphasis on the oil refining industry. The total sludge production for industry resulting from waste water treatment is expected to rise from 23.36 million tons/yr (dry) for the year 1971 to an estimated 47.27 million tons/yr by 1983. Three viable alternatives are available for the disposal of oily sludges and solids: sanitary landfill, land farming, and incineration with landfill of the resultant inert ash. Landfill is the most common and most economical technique currently used by refineries for solids disposal when transport distance is relatively short. However, increasing difficulty with securing adequate landfill sites within economic range and meeting regulatory requirements for landfills may enhance the attractiveness of land farming and incineration. Land farming requires adequate inexpensive land within reasonable transport distance to be economically feasible. Incineration has the advantages of elimination of most odors, operation independent of weather conditions, and substantial reductions in volume and weight of solids. However, its disadvantages include high initial capital investment, high operation costs for minimal volumes of solids, and supplemental fuel needs. (Kreager-FIRL)
W77-02601

**QUEBEC ENVIRONMENTAL REGULATIONS IN THE TEXTILE INDUSTRY...AND ONE COMPANY'S SOLUTION,**
C. Planzer.
Canadian Textile Journal Vol 93, No 10, p 79, 82, 84, 16, 88, October, 1976. 2 fig, 3 tab.

Descriptors: *Chemical wastes, *Textiles, *Waste water treatment, *Activated sludge, *Industrial wastes, Biological treatment, Biochemical oxygen demand, Efficiencies, Performance, sludge, Economics, Legal aspects, Pollution abatement, *Canada.
Identifiers: Latex waste, *Quebec, Textile industry.

Quebec's regulations regarding industrial water pollution and their impact on the textile industry are reviewed along with the installation of an activated sludge treatment plant at one textile manufacturing facility. As of October 8, 1975, a liquid waste management regulation which prohibits the discharge, deposit, or dumping of liquid waste into the environment has been in force. Textile plants that were disposing latex waste at a local dump are now required to dispose of these wastes in approved liquid waste management plants or to obtain a permit if they wish to dispose of it themselves. One plant's answer to the new regulation was the installation of an activated sludge treat-

ment plant. Biolcgical oxygen demand reductions in excess of 95% have been achieved thus far, although the system has been plagued by periodic upsets characterized by rising sludge in the clarifiers. Studies are underway to isolate the specific causes of this behavior. The total cost of the waste treatment facility including engineering and ultimate sludge disposal is expected to be about $4 million. (Kreager-FIRL)
W77-02611

**MUNICIPAL WASTEWATER RECYCLING: A STRATEGY FOR MEETING THE ZERO DISCHARGE GOAL OF PL 92-500,**
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 5D.
W77-02620

**COMPARATIVE METHYLATION CHEMISTRY OF PLATINUM, PALLADIUM, LEAD, AND MANGANESE,**
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5A.
W77-02623

**PESTICIDE RESIDUE ANALYSIS IN WATER (103.1), TRAINING MANUAL,**
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Program Operations.
For primary bibliographic entry see Field 5A.
W77-02624

**THE MARINE BIOLOGICAL IMPACT OF THE HONOLULU GENERATING STATION,**
Hawaii Univ., Honolulu. Sea Grant Program.
For primary bibliographic entry see Field 5C.
W77-02631

**ANALYSIS AND CONTROL OF THERMAL POLLUTION (178) TRAINING MANUAL,**
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Programs Operations.
For primary bibliographic entry see Field 5B.
W77-02632

**COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. V, MONITORING PROGRAM CAPABILITY, DESCRIPTOR TABLES,**
Mitre Corp., McLean, Va.
E. Roberts, R. Spewack, S. Stryker, and S. Tracey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 664, Price codes: A14 in paper copy, A01 in microfiche. Report EPA 560/7-75-001-5, September 1975, 327 p., 1 tab., 1 fig.

Descriptors: *Beryllium, *Cadmium, *Chromium, *Lead, *Mercury, *Polychlorinated biphenyls, *Arsenic compounds, *Monitoring, *Data collection, *Public health statistics, Statistical methods.
Identifiers: *Arsenic, *Cyanide, Monitoring capability, *Toxic substances.

This volume comprises 160 charts which summarize state agency toxic substances monitoring capabilities by state, substance and agency for 25 monitoring program descriptors. Substances monitored are arsenic, beryllium, cadmium, chromium, cyanide, lead, mercury, PCB's, and other substances. (See also W77-02642; W77-02204 and W77-02205) (Katz)
W77-02641

**COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES. VOLUME II, DIRECTORY OF STATE TOXIC SUBSTANCES MONITORING AGENCIES,**
Mitre Corp., McLean, Va.
E. Roberts.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 661, Price codes: A05 in paper copy, A01 in microfiche. Report EPA-560/7-75-001-2, September 1975, 25 p.

Descriptors: *Monitoring, *State governments, Public health, *Basic data collections, Data transmission, Documentation, Metals, Polychlorinated biphenyls, Administrative agencies, State jurisdiction.
Identifiers: *State agency contacts, *State agencies, *Agency directors.

In June 1974 the Office of Toxic Substances, EPA, contacted with MITRE to collect and analyze toxic substances data in the U.S. In the next 14 months MITRE contacted agencies in 20 key states and collected and analyzed their monitoring data. This appendix is a listing of key points-of-contact, phone numbers, agencies, and addresses, for each agency in the 20 states contacted which monitored toxic substances. (See also W77-02641; W77-02204 and W77-02205) (Katz)
W77-02642

**PROCEEDINGS OF: NATIONAL CONFERENCE ON HEALTH, ENVIRONMENTAL EFFECTS, AND CONTROL TECHNOLOGY OF ENERGY USE.**
Environmental Protection Agency, Washington, D. C. Office of Energy, Minerals and Industry.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 845, Price codes: A15 in paper copy, A01 in microfiche. Held in Washington, D.C., February 9-11, 1976. Report 600/7-76-002, 340 p.

Descriptors: *Path of pollution, Water pollution, *Water quality, *Water pollution sources, Heated water, Heavy metals, Environmental effects, Marine animals, Air, Air environment, Air pollution, Air pollution effects, Monitoring, Data collection, Terrestrial habitats, Fuels, *Energy, Energy conversion, Public health.
Identifiers: Environmental health effects, Marine ecological effects, Freshwater ecological effects, Terrestrial ecological effects, *Energy resource extraction, Fuel processing, Flue gas technology, Energy conservation.

Proceedings of a National conference on the health, environmental effects and control technology of Energy use. Subjects covered were atmospheric transport of energy related pollutants, measuring and monitoring of air and water pollution, marine ecological effects, fresh water ecological effects, terrestrial ecological effects, energy resource extraction, fuel processing, flue gas technology and energy conservation. (See also W77-02650 thru W77-02658) (Katz)
W77-02649

**AN ENVIRONMENTAL OVERVIEW OF UNITED STATES ENERGY FUTURES,**
Environmental Protection Agency, Washington, D. C.
S. J. Gage.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p 15-25, 15 fig.

Descriptors: Environmental effects, *Fuels, Fossil fuels, Coals, Natural gas, Oil, *Oil pollution, Oil shales, *Oil wastes, Oily water, Energy, Energy conversion, Heat, Solar radiation, *Geothermal studies, *Coal mine wastes, Water pollution sources, *Coal mines, Strip mine wastes, Water quality, Air pollution, Marine environment.
Identifiers: *Energy production, *Surface coal mining, *Fluidized bed combusion, *Oil shale development, Geothermal energy development.

A general discussion and prediction of the environmental impacts of energy production in the United States. Briefly treated are the impacts of petroleum production in the marine environment, coal mining especially surface mining, coal utilization, including fluidized bed combustion, oil shale development, geothermal energy development and solar energy. (See also W77-02649) (Katz)
W77-02650

**MONITORING WESTERN ENERGY RESOURCE DEVELOPMENTS,**
Environmental Monitoring and Support Lab., Las Vegas, Nev.
R. K. Oser, S. C. Black, D. N. McNelis, S. H. Melfi, and G. B. Morgan.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 47-50.

Descriptors: *Monitoring, *Environmental effects, *Water pollution, *Oil shales, *Water supply, *Water pollution sources, *Strip mine wastes, *Oil shales, *Saline waters, Energy, Coal, Mine wastes, Air pollution, Aquatic environment, Wyoming, Utah, Colorado, Methodology.
Identifiers: Green River formation, *Air monitoring, *Water quality data integration, Remote sensing, *Radiological pollutant monitoring, *Ground water monitoring, *Geothermal monitoring, Technique development.

It is the responsibility of the U. S. Environmental Protection Agency to develop and implement multi-media monitoring systems which can be used at the Federal, State, and local levels to help ensure that this development is in concert with the national commitment to maintain and improve environmental quality. The projects outlined in this paper describe the role of the Environmental Monitoring and Support Laboratory-Las Vegas, in helping to discharge this responsibility. (See also W77-02649) (Katz)
W77-02651

**NOAA'S ACTIVITIES IN ENERGY RELATED MEASUREMENT AND MONITORING,**
National Oceanic and Atmospheric Administration, Rockville, Md.
A. B. Bestul, and W. L. Pugh.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, 600/7-76-002, 1976. p. 51-54.

Descriptors: *Monitoring, *Environmental effects, *Water pollution, *Energy, *Water pollution sources, Aquatic environment, *Air pollution, Oil spills, *Methodology, *Transportation, Waves(Water), Sampling, Water sampling, Data collectors, Estimating, Forecasting, On-Site data collection, Statistical methods, Weather modification.
Identifiers: *Oil spill concentration, Oil spill, *Trajectory forecast, *Shipboard environmental data acquisition, *Atmospheric investigations, Velocity structure.

This paper describes the activities of the National Oceanic and Atmospheric Administration (NOAA) in energy related measurement and monitoring under the Interagency Health and Ecological Effects Program of the Presidential Five-Year Energy R and D Plan. These activities are directed at developing and applying techniques and instrumentation for impact assessment measurements and continuing monitoring of environmental pollutants arising from existing and future energy related facilities. Four projects are devoted to oceanic investigations, and three to atmospheric investigations. (See also W77-02649) (Katz)
W77-02652

**WATER MEASUREMENT AND MONITORING IN ENERGY DEVELOPING AREAS,**
Geological Survey, Reston, Va.
F. A. Kilpatrick.

In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 69-73, 2 tab.

Descriptors: *Monitoring, *Environmental effects, *Water pollution, Energy, *Aquatic environment, *Methodology, Sampling, Water sampling, *Data collections, Forecasts, *On-Site data collections, Statistical methods, Instrumentation, Data collections, Path of pollutants, Biological communities, Oil, Sediment, Suspended solids, Suspended load, Groundwater.
Identifiers: Chronic toxicity, Sub-lethal concentrations, *Aquatic ecosystems, Chronic exposure, *Groundwater monitoring.

The U. S. Geological Survey operates a rather extensive water quality, quantity, and sediment monitoring network in the Rocky Mountains and Northern Great Plains States where there now is great interest in development of major fossil fuel resources. With the sudden emphasis on investigations in this region, the Survey, with assistance from the U. S. Environmental Protection Agency and other agencies, began promptly to increase the number of monitoring stations and to upgrade existing stations. (See also W77-02649) (Katz)
W77-02653

**PARTICIPATION OF ERDA IN THE TRANSPORT AND ECOLOGICAL EFFECTS CATEGORIES OF THE PASS-THROUGH PROGRAM,**
Energy Research and Development Administration, Washington, D. C.
R. E. Franklin, D. S. Ballantine, J. O. Blanton, D. H. Hamilton, and C. M. White.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 106-118, 2 tab, 2 fig.

Descriptors: *Meteorology, Meteorological data, *Monitoring, Measurements, Ecology, Limnology, Oceanography, *Social impact, *Geothermal studies, Trace elements, Water quality, Sediments, *Sediment transport, *On-the-site investigations, *Coal mines, *Coal mine wastes, Aquatic environment, Metals, Chlorine.
Identifiers: *Pass-through program, Transport, Ecological effects, Trace contamination.

ERDA has been funded to do environmental research. ERDA's projects have been in the transport and ecological effects areas. Characterization, measuring and monitoring areas were also funded. The applied science projects include research in meteorology, terrestrial ecology, limnology, oceanography, social science and related areas. (See also W77-02649) (Katz)
W77-02654

**THE EFFECTS OF FRESHWATER WITHDRAWALS ON FISH AND WILDLIFE RESOURCES,**
Fish and Wildlife Service, Washington, D. C. Western Water Allocation.
R. P. Hayden.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 123-125, 1 tab.

Descriptors: *Water quality, Water properties, *Water resources, Water sources, Aquatic environment, Terrestrial habitats, *Fish, *Wildlife, *Environment, *Energy, Planning, Methodology, Monitoring.

The Fish and Wildlife Service is identifying, evaluating, and attempting to solve energy related problems which threaten the water quality and quantity essential for maintenance of viable aquatic and terrestrial habitats. (See also W77-02649) (Katz)
W77-02655

**USDA RESEARCH AND DEVELOPMENT ON EFFECTS OF ENERGY PRODUCTION AND USE OF FRESHWATER RESOURCES,**
Forest Service (USDA), Washington, D.C.
H. E. Brown.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 126-130, 1 tab., 10 ref.

Descriptors: *Water quality, *Water resources, Water sources, Aquatic environment, *Terrestrial habitat, Fish, Wildlife, Environment, Energy, Planning, *Agriculture, *Agricultural runoff, *Forest watershed, *Forests, Water pollution, *Fuels, *Energy, Forest management, Baseline studies.
Identifiers: *Energy conservation, Fuel extraction.

Because agriculture is one of the biggest users of water in the United States, it is vitally concerned with the increasing impacts that energy-related activities are having on the Nation's water resources. U.S. Department of Agriculture agencies conducting programs directly concerned with management of agricultural and forest lands must bear responsibility for maintaining the quality and availability of water resources in the face of these impacts. Of particular concern are pollutants resulting from fuel extraction and diversion of water from agricultural to energy uses. (See also W77-02649) (Katz)
W77-02656

**FRESHWATER ECOLOGICAL EFFECTS,**
Tennessee Valley Authority, Chattanooga.
H. R. Hickey, and P. A. Krenkel.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 132-137.

Descriptors: *Water quality, *Water resources, Aquatic environment, Mining, *Strip mines, *Strip mine lakes, Ecology, Public health, *Baseline studies, Mollusca, Freshwater, Insects, *Thermal power plants, Thermal water, Methodology, *Monitoring, Zooplankton, Toxicity, *Strip mine wastes.
Identifiers: *Surface mining, *Surface mining reclamation, Freshwater insects, Aquatic insects, Aquatic thermal impacts, Zooplankton entrainment, *Ecological recovery.

TVA's research efforts in the area of freshwater ecological effects include several tasks related to impacts of energy technologies on aquatic ecosystems, effects of strip and surface mining and reclamation on water quality and ecology, and one minor project to evaluate the role of strip mine pools in the production of disease-bearing arthropods. (See also W77-02649) (Katz)
W77-02657

**THE EPA RESEARCH PROGRAM ON THE FRESHWATER ECOLOGICAL EFFECTS OF ENERGY DEVELOPMENT AND USE,**
Environmental Protection Agency, Washington, D.C. Office of Health and Ecological Effects.
J. D. Yount.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 138-140, 2 ref.

Descriptors: *Water quality, Water resources, Aquatic environment, *Strip mining, Mining, *Baseline study, *Oil shale, Freshwater, Freshwater fish, Invertebrates, Microbiology, Bioassay, Toxicity, Transportation, *On-site investigations, *Thermal powerplants, Montana.
Identifiers: *On-site conversion, *Coal transportation, *Coal storage, *Oil pipelines.

The Environmental Protection Agency has research projects with five universities to explore the freshwater and watershed environmental degradation which results from coal and oil shale production. The projects hope to produce data which could help predict site selections for future energy sources and conversion facilities which would result in the minimum environmental degradation. (See also W77-02649) (Katz)
W77-02658

**WILDLIFE AND OIL SHALE. A PROBLEM ANALYSIS AND RESEARCH PROGRAM.**
Thorne Ecological Inst., Boulder, Colo.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 521, Price codes: A07 in paper copy, A01 in microfiche. 1975, 112 p, 3 fig, 33 ref. Coordinated by H. D. Burke.

Descriptors: *Mining, *Mine wastes, *Colorado, *Utah, *Wyoming, *Recreation facilities, Geology, Hydrology, *Wildlife habitats, Water quality, Aquatic environment, Aquatic populations, Terrestrial habitats, Fresh water fish, Invertebrates, Social aspects, *Wildlife, Oil shale.
Identifiers: *Reptiles, *Amphibians, *Oil shale development.

This program analysis and research program considers the natural and social environment of the Oil Shale Region of northwestern Colorado, northeastern Utah, and southwestern Wyoming. The purpose was to examine and evaluate the probable consequences of a developing oil shale industry upon the environment, to devise research studies that would evaluate environmental and social changes, and to assist in avoiding or mitigating undesirable changes, particularly as they pertain to wildlife. (See also W77-01236) (Katz)
W77-02659

**BISCAYNE BAY AND ITS ENVIRONS. AN ANALYSIS OF ITS PRESENT AND FUTURE USES FOR METROPOLITAN DADE COUNTY,**
General Oceanics, Inc., Miami, Fla.
T. W. Bilhorn.
Miami University Sea Grant Special Report No. 7, April 1976. 37 p, 4 fig, 1 tab, 15 ref. Originally issued September 1975.

Descriptors: *Florida, *Bays, *Water quality, *Coastal zone, *Pollution abatement, *Recreation demand, *Resources development, Conservation, Land use, Water utilization.
Identifiers: Environmental conditions, *Biscayne Bay(Fla), Resource management.

Biscayne Bay defines the eastern limit for the total length of Dade County. This 225 square mile water body is the single large open space immediately available to the 1 1/2 million residents of the metropolitan area. It is also the single large protected bay within the continental United States with a subtropical environment--allowing year-round usage for resident and winter tourists. Because of a mixture of natural and man-made features, the Bay divides into two units--North and South. There is a strong diversity of present use and future possibilities between these two areas. As any body of water, the Bay's internal circulation transfers the impact at one point to the remaining areas--sometimes rapidly, sometimes slowly. It is therefore a system in itself on a technical basis, and options for its use must recognize the natural factors as constraints. (NOAA)
W77-02680

**BLOODSUCKING MOSQUITOES (DIPTERA, CULICIDAE) OF THE WHITE SEA COAST: III. BREEDING PLACES OF MOSQUITOES OF THE GENUS AEDES, (IN RUSSIAN),**
Moscow State Univ. (USSR). Lab. of Zoology-Entomology.
K. V. Aleksandrova.
Biol Nauki (Mosc) 18(4), p. 18-23, 1975.

Descriptors: *Mosquitoes, *Breeding, Bogs, Coasts, Diptera, Forests, Meadows.
Identifiers: *Aedes species, Culicidae, Diptera, USSR, *White Sea(USSR), *Mosquito control.

The breeding places of 12 spp. of Aedes were found on the White Sea coast (USSR): A. communis, A. punctor, A. pullatus, A. impiger, A. hexodontus, A. pionips, A. dianteus, A. flavescens, A. cinereus, A. caspius, A. intrudens and A. excrucians. These were forest, bog, meadow (littoral, floodplain), cliff and village bodies of water. They differed in temperature conditions, pH of the water, oxidizability of the water, content of dissolved O2, species composition of the mosquitoes and their abundance. Species diversity of the mosquitoes was greater in the bog, littoral and upper cliff water bodies (7 spp. in each) than in the forest and lower cliff water bodies (3 and 2 spp., respectively).--Copyright 1976, Biological Abstracts, Inc.
W77-02699

**TWO DEVICES FOR REMOVING SUPERSATURATING GASES IN AQUARIUM SYSTEMS,**
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
W. R. Penrose, and W. R. Squires.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 116-118, 1976. 1 fig., 1 tab., 7 ref.

Descriptors: *Supersaturation, *Gases, Equipment, *Laboratory equipment, *Aquaria, *Fish diseases, Technology, Fish hatcheries, Laboratory tests, Design, Air-water interfaces.
Identifiers: *Dissolved gases.

Gas supersaturation in aquaria can be relieved by treatment of inflowing water with suitable apparatus. Two devices have been developed for this purpose. The first uses controlled agitation of falling water to bring about equilibrium and operates at flow rates near 40 liters/min; the second agitates the seawater with compressed air and is useful in the flow rate range 0 to 3 liters/min. These designs are modifiable to other flow rates. (Katz)
W77-02706

**ADVANCED WASTEWATER TECHNOLOGY, A SELECTIVE CODED BIBLIOGRAPHY,**
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
For primary bibliographic entry see Field 5D.
W77-02741

**SPILL IN PORTUGAL, A REPORT OF THE JAKOB MAERSK INCIDENT,**
Environmental Protection Service, Halifax (Nova Scotia). Atlantic Region.
F. C. Duerden.
Environmental Impact and Assessment Report EPS-8-EC-76-1, Ottawa, Canada, January 1976. 32 p, 12 fig, append.

Descriptors: *Oil spills, *Coasts, *Oil pollution, Sand bars, Burning, Explosions, Beaches, Disasters, Tourism, Booms, Oil-water interfaces, Mechanical equipment, Skimming.
Identifiers: *Grounding, *Jacob Maersk oil tanker, Oil tankers, *Portugal(Leixoes), Oil slicks, Containment, Cleanup, Skimmers, Dispersants, Mechanical removal, Chemical removal.

In late January 1975, the 88,000 dwt tanker JAKOB MAERSK grounded while entering the port of Leixoes in northern Portugal. Part of the cargo burned, part escaped to sea, and the remainder polluted the shoreline. The cleanup of the oil involved units of the Portuguese Army and Navy, as well members of other agencies and the general population. In spite of the massive amount of oil spilled in the accident, the effects of the spill were relatively slight, due to a well coordinated cleanup effort and a combination of fortunate circumstances. (Environment Canada)
W77-02752

**CONTROLLED COMBUSTION TESTS CARRIED OUT NEAR RIMOUSKI,**
Sherbrooke Univ. (Quebec). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5E.
W77-02759

**REVIEW OF ENVIRONMENTAL CONTROL OF MERCURY IN JAPAN,**
Environmental Protection Service, Ottawa (Ontario).
L. Buffa.
Water Pollution Control Directorate, Economic and Technical Review Report EPS 3-WP-76-7, August 1976, 81p., 4 app., 10 fig, 6 tab, 11 ref.

Descriptors: *Mercury, Landfill, Concretes, Solid wastes, Surveys, Canada, Air pollution, Regulation, Effects, Treatment, Reviews, Environmental control.
Identifiers: *Chlor-alkali plant, Japan, Laws, Canadian Indians, Western Ontario.

Papers presented at the International Congress of Scientists on the Human Environment, Kyoto, Japan, 1975, relating to observations of Japanese scientists on the Canadian mercury pollution situation, have been summarized and are discussed. Japaese legislation relating to mercury discharges is reviewed, as well as compensation law, clean-up procedures, and financial assistance provided to chlor-alkali plants converting from mercury to diaphragm cells. Several industrial installations were visited, and the mercury measures and technology at two Japanese chlor-alkali plants are discussed in some detail. (Environment Canada)
W77-02761

**URBAN DRAINAGE MODEL COMPARISON FOR A CATCHMENT IN HALIFAX, NOVA SCOTIA,**
Nova Scotia Technical Coll., Halifax.
For primary bibliographic entry see Field 2A.
W77-02764

**PRACTICES, POLICIES AND TECHNOLOGY OF STORM AND COMBINED SEWERS IN FOREIGN COUNTRIES.**
Albery, Pullerits, Dickenson and Associates Ltd., Don Mills (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 45, Environmental Protection Service, Environment Canada, Ottawa, Canada, 169 p., 12 tab., 72 ref., 3 append. 74-8-17.

Descriptors: *Storm water, *Sewers, *Sewage, Governments, Costs, United States, Runoff, Research and Development, Water quality standards, *Combined sewers, Eurpe, Waste water treatment.
Identifiers: Sweden, France, Germany, United Kingdom, Switzerland, Historical backgrounds.

This study was undertaken to evaluate pollution problems associated with storm sewer discharges and combined sewer overflows in several European countries and the United States. Current methods used to abate pollution from these sources and research underway to develop new methods were also investigated. Since the magnitude of the problem and the approaches to its solution vary in each country according to the relationships between various levels of government, citizen action groups, industry and research groups, it was necessary to review the governmental structures, historical aspects, and present design criteria for all contributory features of storm and combined sewers in the countries studied. Questionnaires were distributed to local authorities, government departments, research organizations and consulting engineers in Sweden, France, the United Kingdom, Germany and Switzerland. In addition, research engineers visited installations in each country and interviewed key personnel. This report reviews the information obtained during the study and assesses the various methods of combatting pollution from storm and combined sewers, both in the context of the countries concerned, and in relation to the Canadian situation. (Environment Canada)
W77-02767

**SELECTION CRITERIA AND LABORATORY EVALUATION OF OIL SPILL SORBENTS.**
Environmental Protection Service, Ottawa (Ontario).
Technology Development Report EPS-4-EC-76-5, April 1976, 53 p., 5 fig., 11 tab., 10 ref. append. L. A. Robertson, M. F. Fingas, L. B. Solsberg (Editors).

Descriptors: *Oil spills, *Oil-water interfaces, Weight, Performance, Evaluation, Oil pollution, Water pollution control, Pollution abatement.
Identifiers: *Sorbents, *Oil characteristics, Sorption capacity, Sorbent type, Peat moss, Foams, Straws.

Twenty different types of oil spill sorbents were studied in terms of desirable performance and operational criteria. Initially, a preliminary laboratory evaluation of the oil pick-up capacity of several oil sorbents was performed using a Canadian western crude oil. Capacities were then correlated with sorbent prices to give oil sorption costs. Methods employed during this first evaluation were then applied in a subsequent laboratory evaluation in which sorbent capacities were determined both in oil-only and oil/water environments. During the course of these evaluations, maximum sorbent capacity was correlated and compared with the viscosity of the oil recovered. Simulated field tests in outdoor tanks were also conducted in which crude oil and No. 2 fuel oil were spilled in order to determine both the oil pick-up capacity and the oil/water ratios of the sorbents under study. Of those sorptive materials examined, the synthetic polymeric sorbents exhibited the highest oil pick-up capacities and oil/water ratios. (Environment Canada)
W77-02769

**IMPLICATIONS OF THE WATER POLLUTION CONTROL ACT OF 1972 FOR THE MINERAL RESOURCES INDUSTRY, A SURVEY.**
Bureau of Mines, Washington, D.C. Div. of Melallurgy.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 936, Price codes: A04 in paper copy, A01 in microfiche. Report No. BuMines IC 8681, September 1975. 66 p. 7 fig., 22 tab., 1 append.

Descriptors: *Mineral industry, *Federal Water Pollution Control Act, Mills, Mining, Economic impact, Capital costs, Operating costs, Costs, Pollution abatement, Water pollution control, Acid mine water, Mine drainage, Waste water disposal, Idaho, Waste water treatment, Industrial wastes, Water quality standards.
Identifiers: *Effluent guidelines.

The cost of U.S. mining and milling industry compliance with the EPA interim water quality guidelines for waste discharges are summarized and analyzed utilizing data obtained from Army Corps of Engineers applications for discharge permits. Cost of three basic treatment methods were considered: (1) aeration of the waste stream, (2) addition of lime to raise pH, and (3) sedimentation to remove solids. From the process design, cost-capacity graphs were developed to consider maximum flow rate, maximum lime addition, and average flow rates. Fixed capital costs, annual operating costs, and operating cost per ton of product are reported by material being handled. It is concluded that the cost of complying with the

guidelines will prompt the mining industry to minimize the production of waste water. Two case studies, the Bunker Hill electrolytic zinc plant and the Bunker Hill acid mine drainage problem, are presented to illustrate possible actions to minimize waste water production, and to treat combinations of acid mine drainage, mill wastes, and metallurgical process wastes, when treatment is necessary. (Luedtke-Wisconsin)
W77-02806

**CORROSION OF SELECTED MATERIALS IN LAKE MEAD WATER,**
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 8G.
W77-02832

**AN EMPIRICAL ANALYSIS OF PREDICTORS OF INCOME DISTRIBUTION EFFECTS OF WATER QUALITY CONTROLS,**
Utah State Univ., Logan. Dept. of Economics.
J. E. Keith, M. C. Chen, D. C. Reading, and R. Johnson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 010, Price codes: A03 in paper copy, A01 in microfiche. Utah Water Research Laboratory, Publication PRRAE015-1, September 1976. 44 p, 1 fig, 3 tab, 70 ref, 3 append. OWRT B-115-UTAH(1). 14-31-0001-5119.

Descriptors: *Income distribution, Control, *Water quality control, *Methodology, *Forecasting, Regression analysis, Data collections, *Income analysis, Prices, Model studies.
Identifiers: Standard Metropolitan Statistical Areas, Lognormal methodology, Displaced lognormal methodology, Distribution functions methodology, *Simultaneous equation econometric model.

The imposition of water quality controls has been both criticized and praised for its distributional impacts in the popular literature. Few, if any, empirical measures of the distributional impact have been attempted. This research had two objectives: first, to analyze methodologies of measuring income distribution changes, and, second, to select appropriate methodology and empirically test for the impacts of water quality controls. The lognormal, displaced lognormal, gamma, and beta distribution functions were considered as appropriate methodologies. Income distribution data were collected from all Standard Metropolitan Statistical Areas (SMSA) in the United States, and parameters of each of the functions were estimated. A simultaneous equation econometric model was constructed, using a factor-share approach for wage and price changes. Water quality controls were introduced in the model through effects on wages and mean family income, and the latter variables were included in equations estimating the two parameters of the beta distribution function. Water quality data were collected for all states, and indicies of quality were estimated using analysis of variance techniques. Regressions were run for a total of 172 SMSA's, adjusted so that new SMSA's or combined SMSA's from the 1960 data in the 1970 data were deleted from the study.
W77-02833

**ENVIRONMENTAL IMPACT OF CHEMICALS,**
Dow Chemical Co., Midland, Mich.
R. J. Moolenaar.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 167-174. 1 tab.

Descriptors: *Chemicals, *Chemical industry, *Chemical analysis, *Environmental effects, *Toxins, *Toxicity, Poisons, Industrial wastes, Public health, Industrial plants.
Identifiers: Synthetic chemical compounds.

Laboratory tests ranging from simple assessments to sophisticated evaluations are used to anticipate the environmental behavior of synthetic organic chemicals in terms of lifetime, movement, bioconcentration potential and spectrum of biological activity. The development process for a new compound by the chemical industry may be divided into four distinct stages, three of which are associated with a corresponding stage in testing the likely environmental impact of a new chemical. In the first stage, the chemical formula molecular structure and some basic properties are formulated, but no impact evaluation is yet attempted. In the second stage the compound is further characterized and general use categories are defined. Environmental impact at this stage is based on the parameters of stability, movement, bioconcentration and toxicity. The third, or pilot plant stage involves manufacture of the chemical in developmental quantities, and concomitant evaluation of the stage two parametrs in greater depth. In the fourth stage, early efforts are undertaken to market the product in commercial quantities. At this stage, the production plant itself becomes a potential source of discharge into the environment and observations of the surrounding area provide a good indication if the initial test data correctly predicted environmental impact. (See also W77-02835) (Harris-Wisconsin)
W77-02836

**1974 - A YEAR OF TRANSITION,**
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances.
G. L. Schweitzer.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 119-127.

Descriptors: *Chemicals, *Legal aspects, *Legislation, *Toxicity, Social aspects, Poisons, Water pollution effects, Industrial wastes, Pollution abatement, Standards, Economic impact, Social impact.

Highlights of domestic and foreign events and trends affecting environmental concerns during 1973 are reviewed, including actions by the Food and Drug Administration, Environmental Protection Agency, Department of Labor and certain state agencies impacting on regulation of toxic substances. Issues for 1974 are enumerated, including questions of : (1) the possibilities of improving toxicological testing and standard setting; (2) theretical versus pragmatic characteristics of risk/benefit aspects of toxic substances; (3) feasibility of making a generalized approach to developing control strategies for multimedia pollutants; (4) the practicality of an operational early warning system for toxic substances. Developments in the chemical industry are reviewed for their possible impacts on policy issues in toxic substance regulation and control. Generalized predictions are given for issues expected to arise in 1974, and recommendations are made for regulatory and control activities in the coming year. (See also W77-02835)
W77-02840

**A COST-RISK-BENEFIT ANALYSIS OF TOXIC SUBSTANCES,**
Environmental Protection Agency, Washington, D. C.
D. P. Tihansky, and H. Kibby.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 93-117. 10 fig., 15 ref.

Descriptors: *Pollution abatement, *Cost-benefit analysis, *Toxins, Prices, Costs, Hazards, Decision making, Social aspects, Industrial wastes, Poisons, Evaluation, Public health, Economic impact.
Identifiers: *Cost-risk benefit analysis, Risk analysis.

An operational framework is presented which synthesizes cost-benefit analysis for product and service and risk analysis for health and ecology, to create a decision making tool through which public policy on toxic substances can be objectively derived to balance consumer demands for certain products against the environmental risks that they may engender. After risks and cost-benefit impacts are evaluated, the decision maker can compare them to set optimal control levels, setting standards so as to maximize the social welfare outcome of the decision. A number of approaches for doing this are given, with the appropriate choice dependent on the amount of risk-benefit data available to the decision maker as well as the preference for monetary versus nonmonetary values. Cost-risk benefit analysis can be simplified to some extent by minimizing costs of controlling toxic substances, subject to the avoidance of certain risks. But this objective neglects the often high value of products containing or generating toxic elements. Instead, the study assumes that the control costs are eventually paid by the consumer in the form of higher prices, and hence that product benefit changes will reflect these costs. (See also W77-02835) (Harris-Wisconsin).
W77-02844

**THE WORLD HEALTH ORGANIZATION'S ENVIRONMENTAL HEALTH CRITERIA AND AIR MONITORING PROGRAMS,**
National Environmental Research Center, Research Triangle Park, N.C.
F. G. Hueter, S. D. Shearer, and G. G. Akland.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p 82-92.

Descriptors: *International commissions, *United Nations, *Public health, *Epidemology, *Human diseases, Toxicity, Air pollution, Water pollution effects, Diseases, Manganese, Polychlorinated biphenyls, Asbestos, Nitrogen compounds, Nitrates, Nitrites, Pollutants, Standards, Monitoring.
Identifiers: *World Health Organization.

Although the World Health Organization (WHO) as a United Nations body has no policy aimed at developing universally accepted working limits and other quality standards in their approach to environmental health measures, the organization does in fact promote agreement among international scientists on information related to the relationship between exposure to a given measure of a pollutant and accepted maximum levels of a pollutant in an organism or population group. From priority ranking of pollutants according to WHO's health criteria, agreement has been achieved on the need to examine effects of six substances: (1) oxides of nitrogen in ambient air; (2) mycotoxins, especially in largely agricultural tropical countries; (3) nitrates and nitrites in agriculture and food; (4) manganese, especially in its increasing use as a fuel additive; (5) polychlorinated biphenyls; and (6) asbestos. Procedures are described for preparing new WHO criteria documents and for preliminary reviews of pollution study procedures. Description is also given of the WHO air monitoring program, and its environmental health monitoring program. (See also W77-02835) (Harris-Wisconsin)
W77-02845

**PUBLIC INTEREST METHODS FOR ASSESSING CHEMICAL HAZARDS,**
Center for Science in the Public Interest, Washington, D.C.
For primary bibliographic entry see Field 5C.
W77-02846

**LEGISLATION AND LAWS CONCERNING EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES,**
Committee on Commerce (U. S. Senate).
M. B. Brownlee.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washigton (EPA-560/1-75-003, July 1975), p. 35-44. 2 ref.

Descriptors: *Legal aspects, *Legislation, *Toxins, *Toxicity, Social aspects, Poisons, Monitoring, Pollutants, Hazards, Environmental effects, Warning systems, Pesticides.
Identifiers: *Toxic Substances Control Act, *Consumer products, Cosmetics, Food additives, Drugs.

As of early 1974, most existing federal legislation contained no mechanisms for the premarket or premanufacture review of environmental health and safety data for chemical substances. The most important class of environmental contaminants still unregulated were phosphates in detergents, heavy metals and other constituents of consumer products such as paint and drain cleaners, PCBs, packaging and certain other potential hazards. These and other materials which either escape sewage treatment or proper solid waste disposal, or which are more efficiently controlled by regulating the product instead of its disposal, were hazards that the Toxic Substances Control Act (pending in Congress in 1974) was designed to control. Review is given of existing premarket regulatory mechanisms for other hazards and potential hazards, including pesticides, drugs, food additives, antibiotics, insulin and cosmetics. Two broad principles are given for developing public policy on toxic early warning systems: First, the rigor of premarket review should vary with the implied magnitude of the risk involved for a specific chemical or other substance; and second, the greater the latitude given to a regulatory agency for premarket review, the greater the assurance must be that discretion will be used in the application of its powers. (See also W77-02835) (Harris-Wisconsin)
W77-02850

**WATER QUALITY EFFECT OF DIKING A SHALLOW ARID-REGION LAKE,**
Brigham Young Univ., Provo, Utah.
For primary bibliographic entry see Field 5C.
W77-02871

**THE LOCATION OF INDUSTRIAL WATER USERS AND AIR POLLUTION: AN OVERLOOKED RELATIONSHIP,**
Argonne National Lab., Ill. Energy and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W77-02877

**DISTINCTIVE FEATURES OF SELF-PURIFICATION OF WATER AND SEDIMENTS OF A SHALLOW SEA AS EXEMPLIFIED BY THE SEA OF AZOV, (IN RUSSIAN),**
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
A. B. Bronfman, A. Y. Aldakimova, G. D. Makarova, and L. I. Tolokonnikova.
Okeanologiya 16(1), p 91-97, 1976.

Descriptors: *Self purification, Bacteria, *Detergents, Microorganisms, *Oil pollution, *Water pollution, Seasonal, Sediments, Benthos, Oil wastes.
Identifiers: Russian-Sfsr, Shallow, *USSR, *Sea of Azov.

The spatial and seasonal changes in self-purification of the sea from oil products and detergents were studied in the Azov Sea. Farther from the coastal pollution source the self-purification is performed by different biological agents in succession. Four typical zones with specific self-purification were established. Contrary courses of pollution and self-purification processes characterize the pelagic and benthic regions of the sea. The peculiar seasonal dynamics of the self-purification processes in the shallow highly-productive area predetermine a steady accumulation of toxic matter in the benthic regions. (Bacteria and saprophytic microorganisms are mentioned.)--Copyright 1976, Biological Abstracts, Inc.
W77-02897

**SELECTION OF STRAINS IN INVESTIGATIONS FOR HYGIENIC STANDARDIZATION OF THE BACTERIAL COMPOSITION OF DRINKING WATER, (IN RUSSIAN),**
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
For primary bibliographic entry see Field 5C.
W77-02900

**STUDY OF SANITARY PROBLEMS IN CONNECTION WITH INTER-BASIN TRANSFER OF RIVER RUNOFF, (IN RUSSIAN),**
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W77-02905

**EFFECT OF HEAT-EXCHANGE WATERS OF A STATE REGIONAL ELECTRIC POWER PLANT ON CONDITIONS OF WATER USE BY THE POPULATION, (IN RUSSIAN),**
Kemerovo State Medical Inst. (USSR).
Z. P. Lavygina.
Gig Sanit 12, p 90-92, 1975.

Descriptors: *Thermal pollution, Water pollution effects, Electric powerplants, Bacteriology, Water utilization, Water supply, Water quality standards, Attitudes, Water utilization.
Identifiers: USSR.

For 2 yr the effect of thermal waters of large electric power plants on the physiochemical and bacteriologic properties of water was studied on individual stretches of the Tom and Kondoma rivers (USSR) to establish the long-term effect of heat-exchange waters on the rivers and conditions of water use by the population. A questionnaire inquiry of the population using the heated water for drinking (centralized water supply) showed that most of the heated water for drinking (centralized water supply) showed that most of the population considered water with a temperature > 25C unacceptably warm.--Copyright 1976, Biological Abstracts, Inc.
W77-02906

**EXPERIMENTAL SUBSTANTIATION OF THE MAXIMUM ALLOWABLE CONCENTRATION OF DIMIDE IN WATER BODIES, (IN RUSSIAN),**
Academy of Medicine, Sofia (Bulgaria). Center for Hygiene.
For primary bibliographic entry see Field 5C.
W77-02907

**EXPERIENCE IN CENTRALIZED COLLECTION, PROCESSING AND ANALYSIS OF SANITARY-HYGIENIC INFORMATION, (IN RUSSIAN),**
Municipal Sanitary Epidemiology Station, Novokuznetsk (USSR).
For primary bibliographic entry see Field 5A.
W77-02908

**TECHNIQUES FOR REDUCING TURBIDITY ASSOCIATED WITH PRESENT DREDGING PROCEDURES AND OPERATIONS,**
Huston (John), Inc., Corpus Christi, Tex.
J. W. Huston, and W. C. Huston.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 623, Price codes: A06 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Contract Report Report D-76-4, May 1976. 99 p, 22 fig, 3 tab, 42 ref, 4 append.

Descriptors: *Dredging, *Turbidity, Water pollution control, Operations.
Identifiers: Dredged material.

Techniques for reducing turbidity associated with present dredging procedures and operations fall principally in the categories of the cutter, ladder, suction, hull, pipeline, connections, barges, tenders, personnel, inspection, contracts, plans, and specifications. Dredge-induced turbidity is normally apparent only in the immediate vicinity of the dredge plant and the levels of this turbidity are not usually as high as those created by open-water disposal of the dredged material. In addition to applying good dredging techniques to reduce turbidity, better inspection is needed on Corps of Engineers (CE) and CE-related projects. More CE supervision of dredging operations needs to be implemented. More training is required for inspectors, whether CE or private-company personnel. Contracts should clearly and uniformly specify requirements for turbidity-reduction measures and measurements. (WES)
W77-02936

**HYDROLOGIC STUDIES OF THE U.S. GEOLOGICAL SURVEY RELATED TO COAL DEVELOPMENT IN COLORADO.**
Geological Survey, Lakewood, Colo. Water Resources Div.
Open-file report 76-549, August 1976. 22 p, 5 fig.

Descriptors: *Baseline studies, *Water pollution effects, *Coal mines, *Water quality, *Colorado, Surface waters, Groundwater, Sediments, Hydrologic data, Water supply, Evaluation, Projects, Environmental effects.
Identifiers: *Pre-coal-development studies(Colo).

This report summarizes the hydrologic studies related to coal development being conducted by the U.S. Geological Survey in the State of Colorado. The objective of the hydrologic data-acquisition program is to collect surface-water quality and quantity data and ground-water level records. These data are needed to define predevelopment conditions and to monitor the effects of construction and operation of coal mines and waste-disposal areas. Data-acquisition activities related to coal development in Colorado have concentrated on the Yampa River basin. A description of the hydrologic data-acquisition activities, including parameters collected and frequency of collection, precedes the summaries of the three interpretive studies currently in progress. Each study summary consists of the project title, definition of the problem being studied, objective of the study, approach of the study, and when known, the schedule for completion of the study and proposed report products resulting from the study. (Woodard-USGS)
W77-02970

**AN OILSPILL RISK ANALYSIS FOR THE NORTH ATLANTIC OUTER CONTINENTAL SHELF LEASE AREA,**
Geological Survey, Reston, Va. Water Resources Div.; and Department of the Interior, Washington, D. C. Office of Policy Analysis.
For primary bibliographic entry see Field 5B.
W77-02972

**PRELIMINARY RESULTS OF PREIMPOUNDMENT WATER-QUALITY STUDIES IN THE TIOGA RIVER BASIN, PENNSYLVANIA AND NEW YORK,**
Geological Survey, Harrisburg, Pa. Water Resources Div.

For primary bibliographic entry see Field 5B.
W77-02977

**WATER RESOURCES ADMINISTRATION IN VIRGINIA: ANALYSIS AND EVALUATION,**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02996

**THE EFFECT OF RIVER FLUCTUATIONS RESULTING FROM HYDROELECTRIC PEAKING ON SELECTED AQUATIC INVERTEBRATES AND FISH,**
Idaho Univ., Moscow. Water Resources Research Inst.
M. A. Brusven, and C. MacPhee.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 079, Price codes: A04 in paper copy, A01 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, September 1976. 46 p, 18 fig, 8 tab, 23 ref. OWRT A-035-IDA(3), 14-34-0001-7027.

Descriptors: Fluctuations, *Water level fluctuations, Hydroelectric power, Dams, Insects, *Invertebrates, Caddisflies, Diptera, Mayflies, *Aquatic insects, Fish, Salmonids, Chinook salmon, Flumes, Bottom sampling, Diversion structures, *Idaho.
Identifiers: *Fluctuating shorelines, Dworshak Dam(Idaho), *Clearwater River(Idaho), *Hydroelectric peaking, *Salmon River(Idaho).

Diel changes in discharge caused by hydroelectric peaking directly affect water levels and indirectly alter benthos and fish abundance and distribution. Such effects on aquatic insect populations were measured during different peaking regimes below Dworshak Dam on the Clearwater River, Idaho. Here, the benthic insect community has remained relatively stable, but shorelines experiencing daily fluctuations are not readily colonized by some other species. Insects collectively reflected an obvious diel pattern, with the largest numbers drifting at night. When converting the number of drifting insects to a volume-flow relationship, the largest numbers were captured at a depth of 15 cm. A total of 98 species, taken from 3 different depths, were recorded. Flows in a diversion channel on the South Fork of the Salmon River were manipulated to simulate flow fluctuations below a power dam. An upstream section tested insects, a downstream section-fish. During dewatering of the channel, analysis indicated that the insects did not seek greater interstitial depths and became displaced. Stepwise flow reduction caused corresponding reduction in the number of chinook salmon. Although seasonal carrying capacities of the channel differed, the proportion of fish remained about the same after each reduction in flow. A similar situation was observed in an experimental laboratory flume. The number of chinook changed directly with the variation in the rate of flow. Extreme flow reductions significantly increased insect drift and the rate of ingestion by salmon.
W77-03000

**EXTENSIVE OVERBURDEN POTENTIALS FOR SOIL AND WATER QUALITY,**
West Virginia Univ., Morgantown. Div. of Plant Sciences.
For primary bibliographic entry see Field 5B.
W77-03008

**THE MICROBIAL DEGRADATION OF OIL IN CONTINUOUS CULTURE,**
State Univ. of New York at Brockport. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W77-03012

**DETERMINATION OF ESTIMATED MEAN MINE WATER QUANTITY AND QUALITY FROM IMPERFECT DATA AND HISTORICAL RECORDS.**
Environmental Quality Systems, Inc., Rockville, Md.
For primary bibliographic entry see Field 5B.
W77-03014

**PURGING A MUDDY-EARTHY FLAVOR TAINT FROM RAINBOW TROUT (SALMO GAIRDNERI) BY TRANSFERRING TO ARTIFICIAL AND NATURAL HOLDING ENVIRONMENTS,**
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
D. G. Iredale, and R. K. York.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 160-166, 1976. 1 tab., 1 fig., 17 ref.

Descriptors: *Organoleptic properties, *Rainbow trout, *Trout, *Taste, Methodology, *Fish management, Fisheries, *Aquiculture, *Water quality, *Absorption, *Commercial fish foods, Algae, Water quality control, Salmonids.
Identifiers: Purging, *Muddy-earthy taint.

Studies were conducted to determine the length of time required to purge a muddy-earthy flavor taint from pond cultured rainbow trout (Salmo gairdneri) transferred to two different clear water environments. Sensory data from trained judges show that this required 5 days for fish transferred to a rapidly changing purified artificial water environment and 16 days for fish transferred to a relatively static natural water environment to reduce this taint to or below threshold levels of recognition. (Katz)
W77-03023

**MEASURES TO COUNTERACT DAILY WATER POLLUTION: DEVELOPMENT TENDENCIES IN USA, (IN SWEDISH),**
Swedish Council for Building Research, Stockholm.
For primary bibliographic entry see Field 5D.
W77-03035

**WATER HYACINTHS FOR REMOVAL OF CADMIUM AND NICKEL FROM POLLUTED WATERS,**
National Space Technology Labs., Bay St. Louis, Miss.
B. C. Wolverton.
Available from the National Technical Information Service, Springfield, VA 22161 as N75-16129, Price codes: A02 in paper copy, A01 in microfiche. NASA Technical Memorandum, TM-X-72721, February 1975, 10 p, 2 tab, 2 fig, 11 ref.

Descriptors: *Cadmium, *Nickel, Metals, Water pollution, Water pollution control, *Water hyacinth, Aquatic weeds, Aquatic plants, Plant physiology, Methodology, Laboratory tests, *Louisiana.

Removal of cadmium and nickel from static water systems utilizing water hyacinths (Eichhornia crassipes) (Mart.) Solms was investigated. This aquatic plant demonstrated the ability to rapidly remove heavy metals from aqueous systems by root absorption and concentration. Water hyacinths demonstrated the ability to absorb and concentrate up to 0.67 mg of cadmium and 0.50 mg of nickel per gram of dry plant material when exposed for a 24-hour period to waters polluted with from 0.578 to 2.00 ppm of these toxic metals. One hectare of water hyacinths has the potential of removing 300 g of cadmium or nickel from 240,000 liters of water polluted with these metals during a 24-hour period. (Katz)
W77-03041

**THE EMERGENCE OF INSECTS FROM A BRITISH RIVER WARMED BY POWER STATION COOLING-WATER. PART I. THE USE AND PERFORMANCE OF INSECT EMERGENCE TRAPS IN A LARGE, SPATE-RIVER AND THE EFFECTS OF VARIOUS FACTORS ON TOTAL CATCHES, UPSTREAM AND DOWNSTREAM OF THE COOLING-WATER OUTFALLS,**
Central Electricity Generating Board, Ratcliffe-on-Soar (England). Freshwater Biology Unit.
For primary bibliographic entry see Field 5C.
W77-03043

**MINIMAL LEACHING WITH VARYING ROOT DEPTHS OF ALFALFA,**
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3C.
W77-03066

**COMBINED EFFECTS OF LOW OXYGEN AND SALINITY ON GERMINATION OF A SEMI-DWARF MEXICAN WHEAT,**
Escuela Nacional de Agricultura, Chapingo (Mexico). Colegio de Postgraduados.
For primary bibliographic entry see Field 3C.
W77-03068

**FERTILIZER OR SALT LEACHING AS AFFECTED BY SURFACE SHAPING AND PLACEMENT OF FERTILIZER AND IRRIGATION WATER,**
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W77-03072

# 6. WATER RESOURCES PLANNING

## 6A. Techniques Of Planning

**OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK,**
California Univ., Los Angeles. School of Engineering and Applied Science.
J. A. Dracup, C. M. Duke, and S. E. Jacobsen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 985. Price codes: A03 in paper copy, A01 in microfiche. Technical Completions Report, No. 36, Sept. 76. 45 p, 5 tab, 36 ref. (California Water Resources Center, Davis, Project UCAL-WRC-W-339) OWRT B-107 CAL(3), CAL (2), B-144-CAL(4) and B-159-CAL(3).

Descriptors: *Earthquake engineering, *Mathematical models, *Optimization, *Seismic design, Computer programs, Water resources development, *Water distribution systems, Methodology, Networks.

This 3-part interdisciplinary report develops the computational methodology for the optimal network synthesis of a water distribution system in a region of seismic activity. A mathematical programming model is developed whose optimal solution indicates which links of the network are to be constructed, the optimal flow size of each constructed link, and the seismic intensity level each constructed link should be designed to withstand. New standards and procedures of earthquake resistive design and siting of lifeline facilities are needed which reflect the acceptable risk of fatalities, disruption of human activities and property damage. The standards and procedures should be developed through joint efforts among industry associations, professional society committees and research organizations, subject to evaluation by field testing in future earthquakes. The chief ac-

complishment was providing a procedure with which to incorporate seismic risk into the optimal planning of a large scale water resource system. (Snyder-California, Davis)
W77-02831

**AN EMPIRICAL ANALYSIS OF PREDICTORS OF INCOME DISTRIBUTION EFFECTS OF WATER QUALITY CONTROLS,**
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W77-02833

## 6B. Evaluation Process

**PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING, SEPT. - OCT. 1975, (EXECUTIVE SUMMARY).**
Massachusetts Univ., Amherst. Water Resources Research Center.
Available from the National Technical Information Service, Springfield VA 22161 as PB-261 883, Price codes: A02 in paper copy, A01 in microfiche. WRRC Publication No 64, Partial Completion Report, (1976), 14 p. Editor: Barry R. Lawson. Co-Sponsored by Univ. of Mass. Water Resources Research Center and Div. of Water Resources, Mass. Dept. of Environmental Management. OWRT A-090-MASS(1).

Descriptors: *Planning, *Water supply, *Massachusetts, *Comprehensive planning, Regulation, *State governments, *Water policy, Water quality, Management.

A review of Massachusetts' experience by representatives of public agencies suggested that an outline exists of a de-facto water resources plan for the state, at least for the eastern Massachusetts component of that plan. This emerged from a review of the Corps of Engineers' Northeast Water Supply Study and the New England River Basins Commission's Southeast Water Supply Study. The need for additional diversion of water from the Connecticut River to eastern Massachusetts is one common element of the above studies as is the need for more intensive, yet flexible, planning to meet projected needs through 2020 is another. The importance of establishing strong authority for statewide planning by commitment of the Governor and Legislature was stressed as essential to an effective planning effort. Relevant issues discussed included: the need to relate water supply planning to more comprehensive water resource planning, the integration of water supply planning with area-wide waste water management planning and with formal policy of growth of the Commonwealth where this has been formally adopted. (See also W77-02619)
W77-02618

**PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING (SEPT.-OCT. 1975).**
Massachusetts Univ., Amherst. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 885, Price codes: A11 in paper copy, A01 in microfiche. Water Resources Research Center Publication No 64, Completion Report FY-76-11, (1976), 234 p. OWRT A-090-MASS(2), 14-34-0001-6022.

Descriptors: *Planning, *Water supply, *Massachusetts, *Comprehensive planning, Regulation, *State governments, *Water policy, Water quality, Management.

The proceedings record the presentations and discussions of a series of seminars held in Boston in September and October 1975. The objectives of the series included a review of the Commonwealth's experience in water supply planning, specifying the goals of such planning, assessing the available knowledge including experience elsewhere, describing the steps required to establish a continuing statewide planning effort, and identifying needs for research and special studies to advance the overall program. Experience of other states (Illinois, New Jersey and Maryland) was examined. This examination stressed: (1) the essential role of the State in developing and maintaining a comprehensive plan for water supply and (2) the key interrelationship between planning and regulation. The experience of other states provided important insights on the objectives of statewide planning, on the components of a plan, and on the need for strong commitments to these efforts by the Governor, the Legislature and citizens of the State. Relevant issues discussed included: the need to relate water supply planning to more comprehensive water resource planning, the integration of water supply planning with area-wide waste water management planning and with formal policy of growth of the Commonwealth where this has been formally adopted. (See also W77-02618)
W77-02619

**AN ENVIRONMENTAL OVERVIEW OF UNITED STATES ENERGY FUTURES,**
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02650

**ATLANTIC OUTER CONTINENTAL SHELF ENERGY RESOURCES: ECONOMIC IMPLICATIONS FOR LONG ISLAND,**
Cornell Univ. Agricultural Experiment Station, Ithaca, N. Y. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6G.
W77-02664

**A COST-RISK-BENEFIT ANALYSIS OF TOXIC SUBSTANCES,**
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02844

**A COMPARATIVE WATER QUALITY ANALYSIS OF SELECTED RECREATION LAKES AND STREAMS IN THE WHITE MOUNTAINS OF ARIZONA,**
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 5B.
W77-02866

**HYDROLOGY,**
Geological Survey, Raleigh, N.C. Water Resources Div.
R. L. Nace.
In: Handbook of Water Resources and Pollution Control: Published by Van Nostrand Reinhold Company, New York, N.Y., p 1-43, 1976. 8 tab, 70 ref.

Descriptors: *Planning, *Water resources development, *City planning, *Economic justification, *Ecology, Water management(Applied), Water allocation(Policy), Social aspects, Regional development, Evaluation.

Attempts to forecast future water needs generally are unrealistic because they are usually based on traditional modes of water use and traditional methods of planning. A new approach toward water and planning is necessary or the situation will indeed be serious by or before the end of this century. Water is not the governing element in development because few problems are solved by water alone. Water-rich Appalachia is a depressed area. Flourishing southern California is water-deficient. One of the more significant properties of water is its mobility. Since prehistoric time this property has permitted environmental manipulations on ever-increasing scales. This has culminated in the bad environment that is characteristic of many inhabited areas of the world today. The great problems of the future will be restoration and preservation of acceptable environmental quality. Water will be prominent but not the the dominant factor. Planning choices should no longer be made solely on a traditional benefit-cost ratio. Ecological impacts must also be considered. (Woodard-USGS)
W77-02968

**WATER RESOURCES ADMINISTRATION IN VIRGINIA: ANALYSIS AND EVALUATION,**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
W. R. Walker, and W. E. Cox.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 081, Price codes: A12 in paper copy, A01 in microfiche. Bulletin 107, December 1976, 258 p. OWRT B-025-VA(2).

Descriptors: Management, *Virginia, Water resources, *Administrative agencies, Water allocation(Policy), *Institutional constraints, *Administration, *Evaluation, Legal aspects, Water quality control, State governments.
Identifiers: *Interagency cooperation.

A description and analysis of the responsibilities of virginia's administrative agencies and other governmental entities related to water resources management is presented as a basis for evaluating the adequacy of the state's institutional framework for management. Since the existing structure consists of the exercise of specific management functions by several relatively independent management entities, the study explores possible gaps in existing authority, overlapping authority, and the existence of adequate coordination mechanisms between agencies and other government bodies operating in functionally related areas of responsibility. The study focuses primarily on the state's administrative agencies. Detailed consideration is given to the operations of the State Water Control Board, State Department of Health, Virginia Soil and Water Conservation Commission, Commission of Game and Inland Fisheries, State Corporation Commission, Council on the Environment, Department of Conservation and Economic Development, Commission of Outdoor Recreation, Virginia Institute of Marine Sciences and the Virginia Port Authority. The analysis also encompasses other agencies less directly involved in water resources management as well as other governmental bodies exercising such related responsibilities as local governments, interstate commissions, special districts, and the courts of the state. Recommendations to remedy deficiencies identified in the existing structure are presented in several areas, including water policy and management philosophy, water resources development, water quality, ground water, marine resources, water-oriented recreation, and statutory updating. A primary area of concern addressed in these recommendations involves allocation of water and coordination of water resources development. It is suggested that the executive arm of state government assume a more active role in water allocation and water supply planning, and that a higher degree of coordination of water resources development with applicable policy and plans is necessary. Water quality management is another area where institutional change is needed, especially with regard to centralization of administrative responsibilities and coordination of non-point pollution control with the state's primary water quality management program.
W77-02996

## 6C. Cost Allocation, Cost Sharing, Pricing/Repayment

**ECONOMIC MODELS OF WASTER USE, (RANN UTILIZATION EXPERIENCE, CASE STUDY NUMBER 4),**
Houston Univ., Tex.
R. G. Thompson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 248, Price codes: A03 in paper copy, A01 in microfiche. 1975. 26 p., 19 ref.

Descriptors: *Industrial water, Water pollution, *Methodology, *Model studies, Estimating, *Economics, *Economic justification, *Value engineering, *Electric power, *Chemical industry, *Pulp and paper industry, Waste treatment, *Water utilization.
Identifiers: *Iron and steel industry, *Petroleum refining, *Water use models, *Industrial water uses.

Economic modeling of industrial water use and wastewater treatment began as a project to introduce industrial cost data and economic behavior into planning directed toward meeting demands for water and controlling water pollution by the major water-using industries: electric power generation, iron and steel manufacturing, petroleum refining, chemicals, and pulp and paper. The models developed during this research allow identification of methods for minimizing the costs of production--when given effluent charges, prices for water, and other inputs or constraints on the production process, such as reducing the discharge of some pollutant. As the study has progressed, project members have shifted the focus from model development to dissemination, and then to final documentation. It seems likely that much possible utilization lies in the future. (Katz)
W77-02640

**AN EMPIRICAL ANALYSIS OF PREDICTORS OF INCOME DISTRIBUTION EFFECTS OF WATER QUALITY CONTROLS,**
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W77-02833

## 6D. Water Demand

**THE EFFECTS ON AGRICULTURE IN UTAH OF WATER TRANSFERS TO OIL SHALE DEVELOPMENT,**
Utah State Univ., Logan. Dept. of Economics.
B. D. Gardner, K. S. Lyon, and R. Tew.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 012, Price codes: A04 in paper copy, A01 in microfiche. Utah Water Research Laboratory, Publication PRJAE-027-1, June 1976, 57 p, 8 fig, 13 tab, 5 ref. OWRT A-027-UTAH(1). 14-34-0001-6046.

Descriptors: *Institutional constraints, *Oil shale, *Municipal water, Appropriations, *Water transfer, *Water policy, *Utah, Agriculture, Water resources development, Colorado River Basin, Prior appropriation, *Irrigation water, *Economic impact, *Water demand.
Identifiers: Uintah Basin(Utah), White River(Utah).

In part I the institutional factors affecting water distribution in the Upper Colorado River Basin in general and specifically the Uintah Basin are presented. The historical development of the appropriation doctrine of water allocation is outlined and Utah water policy is examined. These institutional factors are analyzed in light of the prototype oil shale development in the Uintah Basin and potential impact on the area's agricultural sector. Oil shale water estimates are compared with Uintah Basin water availability and examined with regard to population projections and municipal water use. Utah water policy and the appropriation doctrine are viewed as restraints to efficient water transfers. In part II irrigation water is treated as a random variable. Its actual quantity is not known ahead of time. If transfers of water to oil shale production affect the variability of water used in agriculture then there will be impacts in agriculture even if the farmers receive the same average quantity of water as originally. These impacts are analyzed in the context of the expected utility maximization hypothesis, i.e., the farmers are hypothesized to maximize expected utility. The measure of an increase in variability is the 'mean preserving spread.' The analyses seek to determine the impact upon expected (average) real income (utility), expected profits (net farm income), purchased inputs, the price of water, and the price of land. The analyses are conducted for both the case where the farmers are risk neutral and where they are risk averse.
W77-02829

**WATER QUANTITY REQUIREMENTS FOR PUBLIC SUPPLIES AND OTHER USES,**
Geological Survey, Reston, Va. Water Resources Div.
J. C. Kammerer.
In: Handbook of Water Resources and Pollution Control: Published by Van Nostrand Reinhold Company, New York, N.Y., p 44-83, 1976. 9 fig, 20 tab, 45 ref.

Descriptors: *Water requirements, *Water utilization, *Water supply, *United States, Surface waters, Groundwater, Domestic water, Public utilities, Industrial water, Municipal water, Withdrawal.

Nearly two thirds of the water used (withdrawn or diverted from a source) in the United States in 1970 came from less than one third of its water-resource regions. Per capita use of water from public supplies nationwide averaged 165 gallons per day, including an estimated 75 gallons per person per day for residential uses. The largest residential water uses were for lawn watering, toilet flushing, and tub and shower bathing. Residential per capita use in 1963 (for some 100 cities, mostly large) ranged from 28 to 116 gallons per day in the 9 eastern regions and from 26 to 275 gallons per day in the 9 western regions in the conterminous United States. Maximum daily use was between 1.1 and 2.9 times the average daily use. Industries that are large water users are commonly self-supplied and not dependent on public-supply systems for most of their water. Water intake (withdrawals) by five groups of industries -- iron and steel, chemicals, pulp and paper, petroleum refining, and food -- accounts for more than 60 percent of the water used by all manufacturing industries; water for cooling is the biggest single type of water use in manufacturing. (Woodard-USGS)
W77-02969

## 6E. Water Law and Institutions

**WASTEWATER REQUIREMENTS MULTIPLY SOLIDS PROBLEMS,**
Texas Univ. at Dallas, Richardson.
For primary bibliographic entry see Field 5G.
W77-02601

**QUEBEC ENVIRONMENTAL REGULATIONS IN THE TEXTILE INDUSTRY...AND ONE COMPANY'S SOLUTION,**
For primary bibliographic entry see Field 5G.
W77-02611

**PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING, SEPT. - OCT. 1975, (EXECUTIVE SUMMARY).**
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02618

**PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING (SEPT.-OCT. 1975).**
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02619

**THE EFFECTS ON AGRICULTURE IN UTAH OF WATER TRANSFERS TO OIL SHALE DEVELOPMENT,**
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W77-02829

**LEGISLATION AND LAWS CONCERNING EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES,**
Committee on Commerce (U. S. Senate).
For primary bibliographic entry see Field 5G.
W77-02850

**WATER RESOURCES ADMINISTRATION IN VIRGINIA: ANALYSIS AND EVALUATION,**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02996

## 6F. Nonstructural Alternatives

**STORM TIDE FREQUENCY ANALYSIS FOR THE OPEN COAST OF VIRGINIA, MARYLAND, AND DELAWARE,**
National Weather Service, Silver Spring, Md. Office of Hydrology.
For primary bibliographic entry see Field 2L.
W77-02661

**ECONOMICS OF STORM PROTECTION,**
Delaware Univ., Newark. Coll. of Marine Studies.
L. G. Anderson, and C. Kellogg.
Sea Grant Technical Report No. DEL-SG-20-76, (1976), 13 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Economics, *Coasts, *Weather data, *Hurricanes, *Cost-benefit analysis, *Climatic data, *Meteorological data, *Delaware, Shore protection, Damages.
Identifiers: Storm protection, Cost effectiveness.

There are two fundamental steps in the design of any storm protection system--predicting the frequency and severity of large storms and designing and implementing an appropriate protection plan. The key to improving storm protection in Delaware is to use historical weather data to evaluate the cost effectiveness of long-run protection methods such as building revetments, maintaining sand dunes and adopting building codes and zoning laws. This study develops a method for evaluating the cost effectiveness of any type of long-run protection measure. Demonstrations of that method show that more restrictive zoning or building codes would cost more than they would save, and that there is some indication that variances in certain cases may lead to net savings. The method also was used to analyze a proposed Army Corps of Engineers project for the Delaware coast. (NOAA)
W77-02672

**OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK,**
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 6A.
W77-02831

## 6G. Ecologic Impact Of Water Development

**ENVIRONMENTAL OUTLOOK: WHERE WE STAND, WHAT'S AHEAD,**
For primary bibliographic entry see Field 5G.
W77-02580

**SYNCRUDE VOWS ENVIRONMENTAL RESPONSIBILITY,**
Syncrude Canada Ltd., Edmonton (Alberta).
For primary bibliographic entry see Field 5D.
W77-02600

**THE ENVIRONMENTAL FATE OF SELECTED POLY-NUCLEAR AROMATIC HYDROCARBONS,**
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W77-02625

**THE MARINE BIOLOGICAL IMPACT OF THE HONOLULU GENERATING STATION,**
Hawaii Univ., Honolulu. Sea Grant Program.
For primary bibliographic entry see Field 5C.
W77-02631

**PARTICIPATION OF ERDA IN THE TRANSPORT AND ECOLOGICAL EFFECTS CATEGORIES OF THE PASS-THROUGH PROGRAM,**
Energy Research and Development Administration, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02654

**FRESHWATER ECOLOGICAL EFFECTS,**
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 5G.
W77-02657

**THE EPA RESEARCH PROGRAM ON THE FRESHWATER ECOLOGICAL EFFECTS OF ENERGY DEVELOPMENT AND USE,**
Environmental Protection Agency, Washington, D.C. Office of Health and Ecological Effects.
For primary bibliographic entry see Field 5G.
W77-02658

**WILDLIFE AND OIL SHALE. A PROBLEM ANALYSIS AND RESEARCH PROGRAM.**
Thorne Ecological Inst., Boulder, Colo.
For primary bibliographic entry see Field 5G.
W77-02659

**PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE.**
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 5C.
W77-02660

**ATLANTIC OUTER CONTINENTAL SHELF ENERGY RESOURCES: ECONOMIC IMPLICATIONS FOR LONG ISLAND,**
Cornell Univ. Agricultural Experiment Station, Ithaca, N. Y. Dept. of Agricultural Economics.
R. J. Kalter, and W. E. Tyner.
Report No. A.E.Res.75-1, April 1975. 85 p, 2 fig, 23 tab, 48 ref.

Descriptors: *Atlantic coastal plain, *New York, *Oil industry, *Resources development, Economics, *Coastal plains, *Oil spills, *Oil pollution, *Environmental effects, Social impact, Geology, Natural gas, Leases, Energy, Continental Shelf, Income, Employment.
Identifiers: *Outer Continental Shelf, *Energy resources, Petroleum reserves, Coastal zone, Refineries, Oil refineries, Production costs.

Three major issues are considered. First the potential impacts (both gross and net) of Atlantic Outer Continental Shelf (AOCS) activities on employment and income within the Long Island region are discussed. Second, required changes in the provision of and expenditures for public services are separately evaluated. Third, potential changes in the recreation and fishing sectors due to offshore petroleum production are analyzed. The AOCS production possibilities for the Mid-Atlantic region are reviewed. Hypothetical reserve estimates by region are provided along with projected costs of exploration and development. Alternative assumptions on timing and location of offshore leasing are analyzed to determine the sensitivity of analytical results to the leasing schedule. The economic and social impacts on Nassau and Suffolk counties are examined. Included in this analysis are potential impacts of exploration, development and productive activity. Direct and indirect income and employment impacts are focused on but fiscal implications for local governments are also reviewed. (NOAA)
W77-02664

**THE ARCTIC COASTAL ENVIRONMENT OF ALASKA. VOL. II: A COMPILATION AND REVIEW OF SCIENTIFIC LITERATURE OF THE ARCTIC MARINE ENVIRONMENT,**
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-02665

**ABSTRACTS. SPECIAL SYNPOSIUM - THE MIDDLE ATLANTIC CONTINENTAL SHELF AND NEW YORK BIGHT,**
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5C.
W77-02678

**THE METULA OIL SPILL,**
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5C.
W77-02679

**BISCAYNE BAY AND ITS ENVIRONS. AN ANALYSIS OF ITS PRESENT AND FUTURE USES FOR METROPOLITAN DADE COUNTY,**
General Oceanics, Inc., Miami, Fla.
For primary bibliographic entry see Field 5G.
W77-02680

**COASTAL ZONE BOUNDARIES.**
Delaware State Planning Office, Dover. Coastal Zone Management Program - Public Involvement.
For primary bibliographic entry see Field 2L.
W77-02685

**ASSATOAGUE MARINE SANCTUARY: A CASE STUDY,**
Virginia Inst. of Marine Science Gloucester Point.
M. P. Lynch, T. F. Smolen, B. L. Laird, and M. A. Patton.
Special Scientific Report No. 94, November 1974. 145 p, 6 append. No. 3-35406.

Descriptors: *Ecology, *Conservation, *Water conservation, *Resources, *Natural resources, *Virginia, *Maryland, Shores, Coasts, Public law, Fisheries.
Identifiers: Resource conservation, Sanctuaries, Marine sanctuaries, Coastal zone, National seashore, Marine parks, Governmental policy formulation, Coastal zone management.

The resources of the Assateague Island region, particularly those in the Chincoteague Bay-Sinepuxent Bay complex would be greatly benefited by protection against development on the western shore of this bay complex. Environmental interests in the Assateague region support the designation of a marine sanctuary to serve this purpose. Local populace believe that existing controls are adequate to protect the region. Physiographically and ecologically the region is ideal for a sanctuary in that it is, plarticularly on the bay side, essentially self contained and subject to little influence from without the area. Assateague Island itself is a barrier island with sand beaches on the ocean side and marshes on the Chincoteague Bay-Sinepuxent Bay side. The Chincoteague Bay complex is a very shallow body of water. Twenty-four percent of the shoreland is presently used for agriculture, 21% is unmanaged (mostly wooded) and 10% is residential. Twenty-three percent is dedicated to recreation and ap proximately 19% is held as preserved area. Careful public education activities and attention to proposed sanctuary regulations will probably go a long way to mitigating general resentment of an increased federal role in the area· management. (NOAA)
W77-02686

**GEOGRAPHIC AREAS OF PARTICULAR CONCERN.**
Delaware State Planning Office, Dover. Coastal Zone Management Program - Public Involvement.
For primary bibliographic entry see Field 2L.
W77-02687

**PROBABILISTIC TRAJECTORY ASSESSMENTS FOR OFFSHORE OIL SPILLS IMPACTING LONG ISLAND,**
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5B.
W77-02689

**NTA (NITRILOTRIACETIC ACID) - AN ECOLOGICAL APPRAISAL,**
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W77-02770

**ON THE HABITABILITY OF MARS, AN APPROACH TO PLANETARY ECOSYNTHESIS.**
Ames Research Center, Moffett Field, Calif.
Report No. NASA SP-414, 1976. 116 p. 18 fig., 23 tab., 16 ref., 2 append. Edited by M. M. Averner and R. D. Mac Elroy.

Descriptors: *Environmental engineering, *Habitats, *Aerobic conditions, Adaptation, Climatology, Physical properties, Chemical properties, Energy budget, Ultraviolet radiation, *Ecology, Cyanophyta, Lichens, Photosynthesis, Computer models, Temperature control, Oxygen, *Ecosystems.
Identifiers: *Mars, Bioengineering.

The theoretical colonization of Mars by terrestrial life, including man, is examined based on the potentiality of photosynthetic oxygen generation by lichens and blue-green algae. A computer model of cyanophyta and lichen predicts that the former could generate approximately 5 mbar of oxygen in 7000 years. To produce an amount necessary for human breathing (ca. 100 mbar) would take 140,000 years. The lichens would take approximately 10 times longer. The study considers modification of the Martian climate by means of advective and greenhouse heating to enhance the prospects for microbiological growth

and the possibility of adapting photosynthetic organisms to the present or modified Martian environment by bioengineering. Such genetic modifications might dramatically increase the probability of generating an oxygen atmosphere and greatly decrease the time needed for its generation. The study approach is based on the Martian orbital parameters, atmospheric parameters and composition, surface winds, solar and ultraviolet radiation, surface temperature in Kelvin units, polar cap parameters, and a chemical inventory. It is theorized that water ice is available in the polar caps and that photosynthetic organisms can produce an ozone shield against the intensive ultraviolet radiation. (Auen-Wisconsin)
W77-02810

**ENVIRONMENTAL EVALUATION OF WATER RESOURCES DEVELOPMENT,**
Texas A and M Univ., College Station. Dept. of Environmental Engineering.
W. P. James, C. E. Woods, and R. E. Blanz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 011, Price codes: A11 in paper copy, A01 in microfiche. Texas Water Resources Institute, College Station, Completion Report, TR-76, July 1976. 249 p, 36 fig, 17 tab, 91 ref, 12 append. OWRT A-028-TEX(1). 14-31-0001-5044. 14-34-0001-6045.

Descriptors: *Environmental effects, Reservoirs, Planning, *Aerial photography, Vegetation, Ecology, *Remote sensing, Geomorphology, *Water resources development, Environment, *Texas, *Topographic mapping, Regional analysis, Evaluation.
Identifiers: *Environmental impact.

Methodology for the utilization of LANDSAT-1 imagery and aerial photography on the environmental evaluation of water resources development is presented. Environmental impact statements for water resource projects were collected and reviewed for the various regions of Texas. The environmental effects of channelization and surface impoundments are discussed for twelve physiographic regions of the state as delineated on black and white satellite (LANDSAT-1) mosaic of band 7. With the aid of LANDSAT-1 imagery, representative or typical transects were chosen within each region. Profiles of each site were constructed from topographic maps and environmental data were accumulated for each site and related to low altitude aerial photography and enlarged LANDSAT-1 false color composites. Each diagrammatic transect, with accompanying data and photographs, provides significant information for input of environmental amenities on a local and regional scale into preliminary water resources development studies. The utilization of the transects provides a visual display of available information, aids in the identification and inventory of resources, assists in the identification of data gaps and provides a planning tool for additional data acquisition. Remote sensing techniques are readily adapted to water resources planning. LANDSAT-1 imagery as well as conventional low altitude aerial photography provides the planner with a synoptic overview of the resource area. The delineation of physiographic regions by LANDSAT-1 imagery will be helpful in defining delicate border areas and delineating broad environmental areas. Satellite imagery is applicable for transect siting in aerial river basin studies or regional analysis.
W77-02828

**PAPERS OF A SEMINAR ON EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES, CONFERENCE REPORT,**
Battelle Memorial Inst., Seattle, Wash.
For primary bibliographic entry see Field 5A.
W77-02835

**ENVIRONMENTAL IMPACT OF CHEMICALS,**
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 5G.
W77-02836

**1974 - A YEAR OF TRANSITION,**
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances.
For primary bibliographic entry see Field 5G.
W77-02840

**REVIEW OF HEALTH/ENVIRONMENTAL SYSTEMS WITH POTENTIAL EARLY WARNING APPLICATIONS,**
Battelle-Columbus Labs., Ohio.
For primary bibliographic entry see Field 5A.
W77-02841

**A RESEARCH PROGRAM TO ACQUIRE AND ANALYZE INFORMATION ON CHEMICALS THAT IMPACT ON MAN AND HIS ENVIRONMENT,**
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W77-02842

**NATIONAL CANCER INSTITUTE PROGRAM OF CANCER SURVEILLANCE, EPIDEMIOLOGY AND END RESULTS REPORTING (SEER PROGRAM),**
National Cancer Inst., Bethesda, Md. Biometry Branch.
For primary bibliographic entry see Field 5A.
W77-02843

**THE WORLD HEALTH ORGANIZATION'S ENVIRONMENTAL HEALTH CRITERIA AND AIR MONITORING PROGRAMS,**
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5G.
W77-02845

**EARLY-WARNING SYSTEM FOR TOXIC SUBSTANCES: HUMAN HEALTH ASPECTS,**
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5A.
W77-02847

**HYDROLOGY,**
Geological Survey, Raleigh, N.C. Water Resources Div.
For primary bibliographic entry see Field 6B.
W77-02968

**AN OILSPILL RISK ANALYSIS FOR THE NORTH ATLANTIC OUTER CONTINENTAL SHELF LEASE AREA,**
Geological Survey, Reston, Va. Water Resources Div.; and Department of the Interior, Washington, D. C. Office of Policy Analysis.
For primary bibliographic entry see Field 5B.
W77-02972

**IMPACTS OF CONSTRUCTION ACTIVITIES IN WETLANDS OF THE UNITED STATES,**
Tereco Corp., College Station, Tex.
For primary bibliographic entry see Field 5C.
W77-03007

# 7. RESOURCES DATA

## 7A. Network Design

**OPTIMAL RAINGAGE DENSITIES AND ACCUMULATION TIMES: A DECISION-MAKING PROCEDURE,**
Oklahoma Univ., Norman. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W77-02798

## 7B. Data Acquisition

**AN ANALYSIS OF GREAT LAKES ICE COVER FROM SATELLITE IMAGERY,**
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2C.
W77-02676

**SCANNING THERMAL PLUMES,**
Wisconsin Univ., Madison. Marine Studies Center.
For primary bibliographic entry see Field 5A.
W77-02682

**A SEQUENTIAL APPROACH TO THE COUNTING OF PLANKTON ORGANISMS,**
Pavia Univ. (Italy).
F. Moller, and M. Bernhard.
Journal of Experimental Marine Biology and Ecology, Vol. 15, p. 49-68, 1974. 6 fig., 7 tab., 8 ref.

Descriptors: *Methodology, *Analytical techniques, Animal populations, *Aquatic populations, *Biological communities, *Plankton, *Sampling, *Surveys, Census, Distribution, Statistical methods.

A counting strategy is described by means of which it is possible to decide, after carrying out a few counts, whether a sampled plankton population can be considered homogeneously distributed. The time saving of the proposed strategy lies in the fact that if the underlying population is homogeneously distributed only one count such as the count of the mixture of aliquots taken from all individual samples collected, would be necessary to characterize the population sufficiently. The count of this mixture may be considered as a 'mean value' equivalent to the mean obtained from the counts of all individual samples. With some experience in predicting where homogeneously and where heterogeneously distributed populations are sampled, it is possible to mix large numbers of samples and thus save a great amount of effort in the analysis of plankton populations. The samples may be collected during a survey in any way desired. (Katz)
W77-02721

**INSTRUMENTATION FOR FIELD STUDIES OF URBAN RUNOFF,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02749

**THE MEASUREMENT AND ESTIMATION OF POTENTIAL EVAPOTRANSPIRATION,**
SCITRAN, Santa Barbara, Calif.
For primary bibliographic entry see Field 2D.
W77-02802

**REX, A COMPUTER CONTROLLED ROBOT FOR IN SITU WATER QUALITY MONITORING,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02814

**TROPHIC CLASSIFICATION OF LAKES USING LANDSAT-1 (ERTS-1) MULTISPECTRAL SCANNER DATA,**
Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W77-02825

**ENVIRONMENTAL EVALUATION OF WATER RESOURCES DEVELOPMENT,**
Texas A and M Univ., College Station. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6G.
W77-02828

**METHOD OF MARKING AQUATIC COLEOPTERA, (IN FRENCH),**
Neuchatel Univ. (Switzerland). Institut de Zoologie.
M. Brancucci.
Mitt Schweiz Entomol Ges 48(3/4), p 455-459, 1975.

Descriptors: *Marking techniques, Methodology, *Aquatic insects, Equipment, Sampling, Tagging.
Identifiers: Acilus, Agabus, Aquatic, *Coleoptera, Colymbetes, Copelatus, Cybister, Dytiscus, Graphoderus, Hydaticus, Hydrophilus, Hydroporus, Hydrous, Hyphydrus, Ilybius, Laccophilus, Noterus, Rhantus.

The problems caused by previously used methods are described. A description is given of an apparatus using a dentist's drill driven by a 6 V motor, the insect being immobilized inside a cylinder with a screen at one end and a piston covered with sponge rubber. A marking code is proposed and the limits of the method discussed. The technique was used for marking such genera as: Dytiscus, Cybister, Acilius, Graphoderus, Hydaticus, Copelatus, Agabus, Ilybius, Colymbetes, Rhantus, Hyphydrus, Hydrous, Hydrophilus, Noterus, Laccophilus and Hydroporus.--Copyright 1976, Biological Abstracts, Inc.
W77-02920

**USE OF AUTOMATED REMOTE SENSING TECHNIQUES TO DEFINE THE MOVEMENT OF TOW-GENERATED SUSPENDED MATERIAL PLUMES ON THE ILLINOIS AND UPPER MISSISSIPPI RIVERS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 2J.
W77-02957

**MAPPING AND MEASURING LAND-COVER CHARACTERISTICS OF NEW RIVER BASIN, TENNESSEE, USING LANDSAT DIGITAL TAPES,**
Geological Survey, Nashville, Tenn. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02978

**DISCHARGE COMPUTATIONS AT RIVER CONTROL STRUCTURES,**
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02986

**A NEW TOWED UNDERWATER CAMERA SYSTEM FOR WIDE-RANGE BENTHIC SURVEYS,**
Vienna Univ. (Austria). Lehrkanzel fuer Meeresbiologie.
R. Machan, and K. Fedra.
Marine Biology, Vol. 33, p. 75-84, 1975. 5 fig, 26 ref.

Descriptors: *Methodology, *On-site data collection, *Photography, *Cameras, *Surveys, *Analytical techniques, *Benthos, *Distribution patterns, *Sampling, Research equipment, Instrumentation, Design, Engineering, Biomass, Data collections, Pollutant identification.
Identifiers: Underwater surveys, *TV-camera.

Following a short review of previous underwater camera systems, a new combined underwater camera system, consisting of a remote controlled TV- and photocamera mounted on a ship-towed steel-tubing sled, is described. The method of using this apparatus for wide-range surveys of the marine littoral benthos, and the techniques used to evaluate and quantify the observations are presented. On the basis of first results obtained in the North Adriatic Sea, the efficiency of the new system is compared with various other instruments and techniques. Advantages and disadvantages, possible improvements, and future prospects are discussed. (Katz)
W77-03030

**A DEVICE FOR ISOLATING FIELD SOIL COLUMNS WITH MINIMUM DISTURBANCE,**
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
For primary bibliographic entry see Field 2G.
W77-03065

**A COMPACTION APPARATUS FOR THE PREPARATION OF SOIL CORES OF DIFFERENT BULK DENSITIES AND THICKNESSES,**
Mississippi State Univ., Mississippi State. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W77-03067

## 7C. Evaluation, Processing and Publication

**GRAPHICAL INTERPRETATION OF WATER QUALITY DATA,**
Mississippi State Univ., Mississippi State. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W77-02592

**PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME II: PROCEDURES AND SELECTED FIELD DATA,**
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5C.
W77-02617

**COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. V, MONITORING PROGRAM CAPABILITY, DESCRIPTOR TABLES,**
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02641

**COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES. VOLUME II, DIRECTORY OF STATE TOXIC SUBSTANCES MONITORING AGENCIES,**
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02642

**GREAT LAKES ICE COVER, WINTER 1974-75,**
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2C.
W77-02677

**COMPUTER-AIDED PLANNING OF REGIONAL SLUDGE DISPOSAL SYSTEMS, USER'S MANUAL,**
B and P Engineers, Kitchener (Ontario).
For primary bibliographic entry see Field 5D.
W77-02745

**COMPUTERIZED SCHEME FOR THE IDENTIFICATION OF AEROMONADS AND MEMBERS OF THE FAMILY ENTEROBACTERIACEAE,**
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02758

**URBAN DRAINAGE MODEL COMPARISON FOR A CATCHMENT IN HALIFAX, NOVA SCOTIA,**
Nova Scotia Technical Coll., Halifax.
For primary bibliographic entry see Field 2A.
W77-02764

**ENVIRONMENTAL INVENTORY AND ASSESSMENT OF NAVIGATION POOLS 24, 25, 26, UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS: AN AQUATIC ANALYSIS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W77-02826

**ENVIRONMENTAL EVALUATION OF WATER RESOURCES DEVELOPMENT,**
Texas A and M Univ., College Station. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6G.
W77-02828

**FEASIBILITY OF MONITORING FLOW PATTERNS AND SEDIMENT AND POLLUTANT DISPERSION OF WATER BODIES WITH 24-CHANNEL SPECTRAL DATA,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02946

**RECORDS OF WELLS AND WATER QUALITY FOR THE GARBER-WELLINGTON AQUIFER, NORTHERN OKLAHOMA AND SOUTHERN LOGAN COUNTIES, OKLAHOMA,**
Geological Survey, Oklahoma City, Okla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02974

**DIGITAL-SIMULATION MODEL OF THE WENONAH-MOUNT LAUREL AQUIFER IN THE COASTAL PLAIN OF NEW JERSEY,**
Geological Survey, Trenton, N. J. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02975

**MAPPING AND MEASURING LAND-COVER CHARACTERISTICS OF NEW RIVER BASIN, TENNESSEE, USING LANDSAT DIGITAL TAPES,**
Geological Survey, Nashville, Tenn. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02978

**SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 2. BASINS FROM NEW YORK TO DELAWARE.**
Geological Survey, Reston, Va. Water Resources Div.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, VA 22202, price $7.00.
Water-Supply Paper 2102, 1976. 985 p, 1 fig.

Descriptors: *Hydrologic data, *Surface waters, *Streamflow, *Lakes, *Northeast U.S., Delaware, Massachusetts, New Jersey, New York, Pennsyl-

vania, Vermont, Basic data collections, Runoff, Discharge(Water), Gaging stations, Flow measurement, Flow rates, Average flow, Reservoirs, Reservoir stages.
Identifiers: *North Atlantic slope basins, Maximum discharges, Minimum discharges, Reservoir content.

This is one of 37 reports presenting records of stage and discharge of streams, and of stage and contents of lakes and reservoirs in the United States during the 1966-70 water years; it contains the records for gaging stations and partial-record stations in the North Atlantic slope basins from New York to Delaware. The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries of total, average, maximum, and minimum discharges. Data for partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table annual maximum stage and discharge at crest-stage stations. For most gaging stations on lakes and reservoirs the data comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. (Woodard-USGS)
W77-02980

**SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME 3. SOUTHERN CENTRAL VALLEY BASINS.**
Geological Survey, Reston, Va. Water Resources Div.
Available from Supt. of Documents, GPO, Wash., D.C. 20402, price $5.25. Water-Supply Paper 2130, 1976. 670 p, 9 fig.

Descriptors: *Hydrologic data, *Surface waters, *Streamflow, *Lakes, *California, Basic data collections, Runoff, Discharge(Water), Gaging stations, Flow measurement, Flow rates, Average flow, Reservoirs, Reservoir stages.
Identifiers: *Pacific slope basins(Calif), Maximum discharges, Minimum discharges, Reservoir content.

This is one of 37 reports presenting records of stage and discharge of streams, and of stage and contents of lakes and reservoirs in the United States during the 1966-70 water years; it contains the records for gaging stations and partial-record stations in the Pacific slope basins in California, Southern Central Valley. The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries of total, average, maximum, and minimum discharges. Data for partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. For most gaging stations on lakes and reservoirs the data comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. (Woodard-USGS)
W77-02981

**WATER-RESOURCES DATA FOR DEEP AQUIFERS ON EASTERN MONTANA,**
Geological Survey, Helena, Mont. Water Resources Div.
W. B. Hopkins.
Water-Resources Investigation 76-40 (open-file report), June 1976. 37 p, 6 fig, 5 tab, 64 ref.

Descriptors: *Groundwater resources, *Groundwater availability, *Water quality, *Deep wells, *Montana, Data collections, Water yield, Chemical analysis, Water wells, Aquifer characteristics.
Identifiers: *Eastern Montana groundwater.

Water from aquifers of Mesozoic and Paleozoic age in eastern Montana is little used. This report presents maps and tables to assist in the evaluation of the water in terms of possible utility. In the southern third of eastern Montana water from the Madison Group or from the Tensleep Sandstone contains less than 2,000 milligrams per liter dissolved solids and is available in amounts of as much as 3,700 gallons per minute (230 liters per second) from individual wells. Elsewhere, dissolved-solids concentrations of water from Mesozoic and Paleozoic aquifers commonly exceed 1,000 milligrams per liter, well yields range from 5 to about 1,500 gallons per minute (0.3 to 95 liters per second), and well depths generally are greater than 1,500 feet (460 meters). (Woodard-USGS)
W77-02985

**DISCHARGE COMPUTATIONS AT RIVER CONTROL STRUCTURES,**
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02986

**INDEX TO WATER RESOURCES DATA FOR ILLINOIS,**
Geological Survey, Champaign, Ill. Water Resources Div.
D. E. Winget.
Water-Resources Investigations 76-87 (open-file report), 1976. 81 p, 4 tab.

Descriptors: *Water resources, *Hydrologic data, Surface waters, *Groundwater, *Illinois, *Indexing, Sampling, Sites, Data collections, Water quality, Sediment transport, Streamflow, Low flow, Gaging stations, Drainage area, Floods.

This index to water resources data for Illinois includes 1,275 sites where surface-water and ground-water data were collected through December 31, 1975. The index is the first comprehensive tabulation of data collected in Illinois by the U.S. Geological Survey; data collection began in 1903. Information included are the county code, drainage area, datum, type of data available, period of record, where data are filed, and the name of the current cooperating agency. The surface-water index is listed sequentially by station number and also alphabetically by station name. Station numbers for the ground-water index are grouped by counties. The hydrologic unit index shows all sites and is listed by the respective hydrologic boundaries. (Woodard-USGS)
W77-02990

**DIGITAL GROUND-WATER MODEL OF THE OGALLALA AQUIFER IN PARTS OF WASHINGTON AND YUMA COUNTIES, NORTHERN HIGH PLAINS OF COLORADO,**
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02991

**ANALYSIS OF NONPOINT-SOURCE POLLUTANTS IN THE MISSOURI BASIN REGION,**
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W77-03013

**DETERMINATION OF ESTIMATED MEAN MINE WATER QUANTITY AND QUALITY FROM IMPERFECT DATA AND HISTORICAL RECORDS.**
Environmental Quality Systems, Inc., Rockville, Md.
For primary bibliographic entry see Field 5B.
W77-03014

**COLORADO RIVER BASIN PILOT PROJECT, COMPREHENSIVE EVALUATION REPORT, FIVE WINTER SEASONS 1970-71 TO 1974-75,**
Aerometric Research Inc., Goleta, Calif.
For primary bibliographic entry see Field 3B.
W77-03060

# 8. ENGINEERING WORKS

## 8A. Structures

**DEVELOPMENT OF NAVIGATION WITH LOCKS AND DAMS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02943

## 8B. Hydraulics

**DELAWARE'S CHANGING SHORELINE,**
Delaware Univ., Newark. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-02684

**HYDRODYNAMICS-DISPERSION STUDIES IN STORM SEWERS,**
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Civil and Environmental Engineering.
A. M. Oguntuase, and E. L. Bourodimos.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 990, Price codes: A12 in paper copy, A01 in microfiche. Rutgers University, Water Resources Research Institute, Completion Report, September 1976. 236 p, 33 fig, 22 tab, 133 ref, append. OWRT A-032-NJ(1).

Descriptors: *Storm drains, Turbulence, Equations, *Open channel flows, Sewers, Hydrodynamics, *Diffusion, *Dispersion, *Turbulent flows, *Mathematicl models, Numerical analysis, Velocity, *Computer models, *Simulation analysis, Model studies.
Identifiers: Sewer flow, *Dispersion-diffusion coefficients, Turbulent diffusion, Finite difference equations, *Mass transport equations.

The objective was to simulate through mathematical modeling and laboratory experimentation, the hydrodynamics of diffusion-dispersion processes in partially-full pipe flows descriptive of sewer flows. Equations of motion and species balance-mass transport were derived with boundary conditions applicable to free surface flows in circular pipes. Turbulent flow momentum equation was solved by a modified successive approximation (SOR) numerical technique for steady flow conditions to obtain the velocity profiles, through which turbulent diffusion coefficients were estimated. Species mass transport equations were solved numerically in the three-dimensional cases of longitudinal convection with lateral and vertical diffusion. Laboratory measurements in an experimental flume were taken to provide data for verification and comparison with the theoretical predictions. The developed computer simulation model provides adequate estimates of values of longitudinal dispersion coefficients suitable for circular open channel and sewer flow analysis, design and pollution assessment and control.
W77-02827

**HYDRAULIC CHARACTERISTICS OF RIGOLETS PASS, LOUISIANA, HURRICANE SURGE CONTROL STRUCTURES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. C. Berger, Jr, and R. A. Boland ,Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031

756, Price codes: A05 in paper copy, A01 in microfiche. Technical Report H-76-16, September 1976. 92 p, 10 fig, 28 tab, 12 photo, 25 plates, append.

Descriptors: *Control structures, *Hydraulic models, *Steady flow, *Currents(Water), *Louisiana, Model studies.
Identifiers: *Lake Pontchartrain(La).

The Rigolets model was a fixed-bed model constructed to undistorted linear scale ratios of 1:100 horizontally and 1:100 vertically. The region reproduced by the model is 3.2 miles of the Rigolets, starting at the Lake Pontchartrain entrance of the Rigolets. The model was equipped with the necessary appurtenances for reproduction of steady-state flow in both ebb and flood directions and accurate measurement of water-surface elevations and currents under this condition. Verification tests were conducted to make certain that the model hydraulic regimen agreed with that of the prototype. The agreement attained between water-surface elevations and current velocities from similar model and prototype conditions was considered satisfactory. The testing program consisted of water-surface elevations, current velocities, and surface current patterns for various control structure plans. Possible scouring problems near the Fort Pike State Monument were noticed during testing of plans 2, 2A, and 2B. To remedy this situation the structure was shifted 250 ft away from the Fort Pike bank of the Rigolets Pass. Additional data which were taken for each test plan in the navigation canal with the lock open are presented in Appendix A. (WES)
W77-02932

**NUMERICAL MODELING OF RESONANT OSCILLATIONS IN DEEP DRAFT HARBORS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. R. Houston.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A028 051, Price codes: A04 in paper copy, A01 in microfiche. Research Report H-76-1, July 1976. 59 p, 6 fig, 23 pl, 23 ref.

Descriptors: *Finite element analysis, *Mathematical models, *Harbors, *Waves(Water), *Numerical analysis, Model studies, *Hydraulic models.

An investigation was undertaken to evaluate numerical models that can be used to predict harbor response to long-period wave excitation for both conventional harbors with deep drafts and artificial offshore ports in deep water. Numerical models using finite difference, hybrid finite element, and Lee's method solutions are discussed and compared with analytical solutions, hydraulic model data, and prototype field data. The hybrid finite element method of solution is shown to adequately predict periods of resonant peaks and model water-surface elevation patterns in conventional and offshore harbors. Computational time requirements of this numerical model are shown to be sufficiently low to make resonant response calculations economically feasible for a wide range of incident wave periods. Use of the hybrid finite element method to evaluate deep draft harbor design or modification and to aid hydraulic model studies of harbor oscillations is discussed. (WES)
W77-02935

**U.S. ARMY CORPS OF ENGINEERS FOURTH HYDROGRAPHIC SURVEY CONFERENCE, 5-6 NOVEMBER 1975,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
E. D. Hart, and G. C. Downing.
March 1976. 121 p, 7 fig, 10 photo, 5 append.

Descriptors: *Hydrograph analysis, *Hydrographs, *Hydrography, Hydraulics, *Conferences, Surveys, Information exchange.
Identifiers: *Hydrographic surveys.

Conference held in New Orleans, 5-6 Nov. 1975, for the purpose of exchanging ideas, methods, and experiences of CE surveying personnel. The following papers were presented: The Buffalo District's Small Boat Integrated Hydrographic Surveying and Positioning System, by J. LaFountain. Review of the Corps Hydrographic Survey Study Program, by E. D. Hart, Surveys of Wicomico River, by R. A. Pruhs. Teledyne Integrated Electronic Positioning System, by C. E. Weddle. Del-Norte-Autocarta X Hydrographic Survey System, by J. Bechly. A Simultaneous Evaluation of Motorola and Cubic Hydrographic Survey Systems, by J. T. Long. Hydrography in the Arctic, by E. Brown. The Automation of Soundings in the Rijkswaterstaat (The Netherlands), by D. J. Bakker, and others. (WES)
W77-02937

**MODEL MATERIALS EVALUATION SAND TESTS; HYDRAULIC LABORATORY INVESTIGATION,**
Coastal Engineering Research Center, Fort Belvoir, Va., and Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8G.
W77-02938

**COOPER RIVER REDIVERSION PROJECT, BUSHY PARK WATER SUPPLY TESTS; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
H. A. Benson, and W. H. Bobb.
Available from the National Technical Information Service, Springfield, Va. 22161, Price codes: A08 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-5, March 1976. 168 p, 4 fig, 48 tab, 94 pl.

Descriptors: *Hydraulic models, *Rivers, *Diversion, *Water quality, *Water supply, Model studies, *South Carolina, *Saline water intrusion.
Identifiers: *Charleston Harbor(SC), Cooper River(SC).

The Charleston Harbor model reproduced the Ashley, Cooper, and Wando Rivers, and a portion of the Atlantic Ocean. The model was of fixed-bed construction and was equipped with all the necessary appurtenances for accurate reproduction and measurement of tides, tidal currents, salinity intrusion, and other significant phenomena of the prototype. Hydraulic and salinity tests were made for six weekly release schedules from the Pinopolis power plant. The results of the six tests indicated that, due to redivision, tide levels in the upper Cooper River, Back River Reservoir, and the East Branch of the Cooper River were lowered by amounts between about 0.3 ft and 2.0 ft. Tides at stations in lower Cooper River, the Wando River, and the Ashley River were relatively unchanged. Surface and bottom ebb predominance was decreased drastically in the upper reaches of Cooper River, and was more nearly balanced throughout the length of Cooper River for rediversion conditions than for existing conditions. The degree of salinity stratification was significantly reduced throughout the system for rediversion conditions. (WES)
W77-02939

**STABILITY OF RUBBLE-MOUND BREAKWATER LAHAINA HARBOR, HAWAII; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. D. Carver.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD/A-024 773, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-8, April 1976. 31 p, 2 fig, 1 tab, 6 photo, 8 plates, 1 ref, append.

Descriptors: *Breakwaters, *Hydraulic models, *Hawaii, *Harbors, Model studies.
Identifiers: *Rubble-mound breakwaters, Lahaina Harbor(Hawaii).

A hydraulic model study was conducted to investigate the adequacy of two breakwater sections proposed for Lahaina Harbor, Hawaii. The purpose of the study was to determine (a) the stability of the structure when attacked by the largest waves which may occur in the area, (b) the amount of wave overtopping occurring for the most severe wave condition, and (c) the magnitude of transmitted wave heights associated with a selected range of incident wave conditions. All test were conducted in a 5-ft-wide, 4-ft-deep, and 119-ft-long concrete wave flume at an undistorted linear scale of 1:22 model to prototype. It was concluded that both proposed breakwater sections will (a) maintain their structural integrity, (b) meet the nonovertopping criteria, and (c) prevent excessive wave energy transmission through the breakwater. (WES)
W77-02940

**FALLS LAKE WATER-QUALITY STUDY; HYDRAULIC LABORATORY INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02941

**A VARIATIONAL APPROACH TO NONLINEAR WAVE THEORY,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. W. Whalin.
Miscellaneous Paper H-76-16, August 1976. 43 p, 1 tab, 3 ref, append.

Descriptors: *Waves(Water), Variability, Theoretical studies, Equations, *Movement.
Identifiers: *Wave reflection, Nonlinear wave theory, Equations of motion(Waves).

A variational approach to nonlinear wave theory is explored by deriving the equations of motion for four sm all amplitude constant depth theories, two finite amplitude constant depth theories, and one small amplitude variable depth theory. It is determined that the rotational wave theories derived are more appealing than the irrotational theories. The characteristic relation is explored for the above theories and the effect of vertical velocity on wave reflection is investigated. Further numerical and experimental efforts are warranted to investigate the validity of the equations of motion for describing shallow water wave phenomena. Although the methodology used requires conservation of energy, the possibility exists that a variational approach might be derived for a nonconservative system (thus allowing frictional energy dissipation and energy loss by breaking). (WES)
W77-02942

**DEVELOPMENT OF NAVIGATION WITH LOCKS AND DAMS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. J. Franco.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD/A-029 355, Price codes: A04 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-15, June 1976. 48 p, 9 fig, 10 ref, append.

Descriptors: *Dams, *Cofferdams, *Locks, *Navigation, Rivers, Shoals, Barges.

The need for locks and dams for the development of navigation on some streams and the problems that could be encountered are discussed in this report. Satisfactory navigation conditions depend on the site selected, characteristics of the stream,

orientation and arrangement of the structure and related facilities, and type of traffic anticipated. Tows approaching the locks could be affected by adverse currents that could be hazardous or cause delays. The lock arrangement should consider the currents to be caused by the completed structure and the effects of these currents on the movement of tows. Model studies can be invaluable in determining the adequacy of a proposed structure and modifications required to eliminate any undesirable conditions. New concepts in lock arrangements should be considered to improve safety and efficiency. Shoaling in the lock approaches can present serious problems but can be eliminated or minimized with special structures. Cofferdam plans should consider maintenance of navigation during construction and the effect of scour on its stability. Deflectors can be used to move the scour area away from the main cofferdam. (WES)
W77-02943

**ESTIMATION OF WINDS OVER THE GREAT LAKES,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 2H.
W77-02944

**TRANSMISSION OF WAVE ENERGY THROUGH AND OVERTOPPING OF THE LONG BEACH, CALIFORNIA, BREAKWATER; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
L. Z. Hales.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD/A-025 175, Price codes: A04 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-10, May 1976. 60 p 13 fig, 11 tab, 8 ref, 2 append.

Descriptors: *Breakwaters, *Hydraulic models, *Waves(Water), Model studies, *California, *Harbors.
Identifiers: *Long Beach Harbor(Calif), *Los Angeles Harbor(Calif), Wave transmission.

In order to meet growing future demands, a 10- to 15-yr harbor expansion program for the ports of Los Angeles and Long Beach, Calif., has been designed to provide an increased amount of terminal space and berthing areas. This increased space will be developed by dredging and landfill construction in the Outer Harbor, leaving a 1,000-ft-wide channel between the breakwater and the landfill. As part of the U.S. Army Engineer sponsored study of the Los Angeles-Long Beach Harbor complex, deepwater wave characteriistics approaching the area were propagated numerically into shallow water (to the breakwater) and the effects of refraction and shoaling were determined. The transmission coefficient obtained from this experimental study then were applied to these data, and estimations of the magnitude and duration of specific waves occurring in the channel were developed. (WES)
W77-02945

**FEASIBILITY OF MONITORING FLOW PATTERNS AND SEDIMENT AND POLLUTANT DISPERSION OF WATER BODIES WITH 24-CHANNEL SPECTRAL DATA,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02946

**EFFECTS OF 40-FOOT CHARLESTON HARBOR PROJECT ON TIDES, CURRENTS AND SALINITIES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
H. A. Benson.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A024 524, Price codes: A09 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-9, May 1976. 185 p, 4 fig, 70 tab, 88 pl.

Descriptors: *Hydraulic models, *Navigation, *Salinity, *Tides, *Currents(Water), Model studies, *South Carolina, Harbors.
Identifiers: *Charleston Harbor(SC).

The Charleston Harbor Model reproduced the Ashley, Cooper, and Wando Rivers and a portion of the Atlantic Ocean. The model was of fixed-bed construction and was equipped with all the necessary appurtenances for accurate reproduction and measurement of tides, tidal currents, salinity intrusion, and other significant phenomena of the prototype. The results of tests for existing flows in the Cooper River indicated that: (a) The maximum changes in tide range and levels were 0.2 ft in portions of the estuary. (b) The probable area of heavy shoaling near the upstream end of the Federal channel in the Cooper River was shifted upstream and may be more concentrated at the upper end; (c) an increase in shoal material moving into the Ashley River probably will occur; (d) the Wando River shoaling potential was not changed; (e) the limit of intrusion of salt water (100 ppm) in the Cooper River was shifted from about 25.0 to about mile 27.5; and (f) the salinity conditions in the Ashley River, Wando River, and Clouter Creek were increased 2 to 3 ppt. (WES)
W77-02947

**NUMERICAL ANALYSIS OF TIDAL CIRCULATION FOR LONG BEACH HARBOR; REPORT 1, EXISTING CONDITIONS AND ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL STUDY,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. C. Raney.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031 174, Price codes: A07 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-4, September 1976 (Report 1 of a series). 140 p, 14 fig, 3 tab, 102 pl, 4 ref, append.

Descriptors: *Harbors, *Numerical analysis, *Piers, *Tides, *California, *Numerical analysis, Model studies.
Identifiers: *Tidal currents, *Tanker terminals, *Long Beach Harbor(Calif).

A study was conducted for Long Beach Harbor to numerically investigate tidal circulation in existing basins and to define and evaluate the impact of possible modification of Pier J on existing harbor circulation. A two-dimensional depth-averaged formulation of the hydrodynamic equations was used in the model and an implicit-explicit finite difference scheme was used to numerically solve the equations. The numerical model was verified using tide and velocity data from the prototype and from physical model tests conducted at WES. For each Pier J modification considered, overall tidal circulation patterns were obtained hourly by vector plots of the tidal velocity at each finite difference cell. The change in overall tidal circulation patterns from those presently existing were also determined. The mass flow rates through the breakwater openings and channels were calculated and compared with those flows currently existing in the harbor. Changes in flow rates as a result of the Pier J modification were identified. (WES)
W77-02948

**NUMERICAL ANALYSIS OF TIDAL CIRCULATION FOR LONG BEACH HARBOR; REPORT 3, EXISTING CONDITIONS AND ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL STUDY WITH -82 FT CHANNEL,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. C. Raney.
Available from the National Technical Information Service, Springfield VA 22161 as AD-A031 178, Price codes: A07 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-4, September 1976 (Report 3 of a series). 141 p, 14 fig, 3 tab, 102 pl, 6 ref, append.

Descriptors: *Harbors, *Numerical analysis, *Piers, *Tides, *California, Model studies.
Identifiers: *Tidal currents, *Tanker terminals, *Long Beach Harbor(Calif).

A study was conducted for Long Beach Harbor to numerically investigate tidal circulation in existing basins and to define and evaluate the impact of possible modification of Pier J on existing harbor circulation. A two-dimensional depth-averaged formulation of the hydrodynamic equations was used in the model and an implicit-explicit finite difference scheme was used to numerically solve the equations. The numerical model was verified using tide and velocity data from the prototype and from physical model tests conducted at WES. For each Pier J modification considered, overall tidal circulation patterns were obtained hourly by vector plots of the tidal velocity at each finite difference cell. The change in overall tidal circulation patterns from those presently existing were also determined. The mass flow rates through the breakwater openings and channels were calculated and compared with those flows currently existing in the harbor. Changes in flow rates as a result of the Pier J modification were identified. (WES)
W77-02949

**LONG BEACH HARBOR NUMERICAL ANALYSIS OF HARBOR OSCILLATIONS; REPORT 1, EXISTING CONDITIONS AND PROPOSED IMPROVEMENTS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. R. Houston.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031 171, Price codes: A08 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-20, September 1976 (Report 1 of a series). 194 p, 1 fig, 5 tab, 161 pl, 11 ref, append.

Descriptors: *Finite element analysis, *Harbors, *Numerical analysis, *California, *Model studies, Hydraulic models.
Identifiers: *Long Beach Harbor(Calif), Harbor oscillations.

A hybrid finite element numerical model was used to calculate harbor resonance for existing conditions and proposed improvements of Los Angeles and Long Beach Harbors. The numerical model calculates harbor oscillation for harbors of arbitrary shape and variable depth. Ten finite element numerical grids were used to calculate the response of the harbors complex for incident waves with periods from 1 to 10 min. Calculations of the model for existing conditions of the harbors were shown to be in good agreement with prototype measurements. The numerical model calculations indicate that resonant oscillations in existing harbor facilities will not be radically altered by the proposed modifications of the harbors complex. The resonant oscillations are, in general, somewhat smaller for the modified conditions of the harbors complex than for existing conditions. (WES)
W77-02950

**LONG BEACH HARBOR NUMERICAL ANALYSIS OF HARBOR OSCILLATIONS; REPORT 3, ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL PROJECT (62- AND 82-FT DEPTHS),**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. R. Houston.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031 173, Price codes: A04 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-20, September 1976 (Report 3 of a series). 61 p, 47 plates, append.

Descriptors: *Finite element analysis, *Numerical analysis, *Harbors, *Mathematical models, *Piers, *California, Model studies.
Identifiers: Tanker terminals, *Harbor oscillations, *Long Beach Harbor(Calif).

A hybrid finite element numerical model was used to calculate harbor response for three alternate geometrical plans and two water depths for the Pier J completion and tanker terminal project of Long Beach Harbor. The numerical model calculates harbor oscillation for harbors of arbitrary shape and variable depth. Three finite element grids which covered areas only in the immediate vicinity of the breakwater-protected tanker terminal area were used to calculate the response of this area to incident waves with periods from 30 sec to approximately 6 min. (WES)
W77-02951

**DESIGN FOR WAVE PROTECTION, FLOOD CONTROL, AND PREVENTION OF SHOALING, CATTARAUGUS CREEK HARBOR, NEW YORK; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. R. Bottin, Jr, and C. E. Chatham, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A019 024, Price codes: A07 in paper copy, A01 in microfiche. Technical Report H-75-18, November 1975. 144 p, 4 fig, 23 tab, 73 photo, 30 plates, 19 ref, append.

Descriptors: *Breakwaters, *Channel improvement, *Flood control, *Harbors, *Hydraulic models, *Shoals, *Waves(Water), *New York.
Identifiers: *Cattaraugus Creek Harbor(NY).

A 1:75-scale undistorted hydraulic model of the lower 5400 ft of Cattaraugus Creek and sufficient offshore area in Lake Erie to permit generation of the required test waves was used to investigate the arrangement and design of certain proposed improvements with respect to shoaling, wave protection, and flood control. The proposed improvement plans consisted of (a) breakwaters in Lake Erie at the mouth of Cattaraugus Creek, aggregating about 2300 ft in length; (b) a berm, about 700 ft in length, extending northward from the inner end of the north breakwater to high ground; (c) a 120-ft-wide, 8-ft-deep entrance channel, about 1900 ft in length, extending from the 8-ft contour in the lake to the maneuvering area; (d) a 6-ft-deep maneuvering area 300 ft wide by 600 ft long; (e) a 120-ft-wide, 6-ft-deep channel, extending upstream approximately 1900 ft from the maneuvering area; (f) a riprapped friction section extending about 750 ft upstream from the navigation channel through the New York Central Railroad bridge; (g) two levees on the left bank aggregating about 770 ft in length; and (h) development of recreational facilities. (WES)
W77-02952

**ICE FLUSHING FROM ST. LAWRENCE SEAWAY LOCKS; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
N. R. Oswalt.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A028 021, Price codes: A03 in paper copy, A01 in microfiche. Technical Report H-76-9, July 1976. 45 p, 4 fig, 10 photos, 9 plates.

Descriptors: *Hydraulic models, *Ice, *Ice jams, Rivers, Lakes, *Locks, *St. Lawrence Seaway, Model studies.

The St. Lawrence Seaway Development Corporation secured the service of the U.S. Army Engineer Waterways Experiment Station to determine, with the aid of physical model tests, the most effective and economical method of ridding a lock chamber of floating ice. Tests were conducted in an existing 1:25-scale lock model modified to simulate the pertinent features of the St. Lawrence Seaway Lock chambers. A manifold at the upstream end of the chamber proved best for flushing ice from the chamber. Flow through the manifold was pumped from various locations in the chamber or piped through the upstream miter gate sill; both of these methods were designed to create a sufficient slope of the water surface in the chamber to flush the ice. These model tests provided the means to determine the size and configuration of the manifold and the amount of flow required for total flushing. The concept of pumping water to an upstream manifold from the lower end of the chamber was tested with limited success. Optimum flushing of the surface ice was accomplished with four 4-ft-diam pipes spaced 16 ft apart between the lock walls with their center line level with the lower pool. A total discharge of 2000 cfs was required for optimum flushing. (WES)
W77-02953

**LOS ANGELES AND LONG BEACH HARBORS MODEL STUDY; REPORT 3, ANALYSES OF WAVE AND SHIP MOTION DATA,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. L. Durham, J. K. Thompson, D. G. Outlaw, and L. G. Crosby.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A016 904, Price codes: A09 in paper copy, A01 in microfiche. Technical Report H-75-4, July 1976 (Report 3 of a series). 460 p, 4 fig, 54 tab, 37 plates, 34 ref, 9 append.

Descriptors: *Waves(Water), *Harbors, *California, *Model studies.
Identifiers: *Long Beach Harbor(Calif), *Los Angeles Harbor(Calif), *Ship motion data, *Tidal currents, Harbor oscillations.

This report describes the procedures and presents the results of analyses of prototype ship motion and wave data collected in the Los Angeles and Long Beach Harbors during a 1-yr data acquisition program. The wave data were collected by the U.S. Army Engineer Waterways Experiment Station (WES) and the ship motion data were obtained by personnel of the Ports of Los Angeles and Long Beach under the direction of the U.S. Army Engineer District, Los Angeles. All analyses of these data were performed by WES. The model study has four major objectives: (a) To determine incidence and severity of troublesome oscillations in the present harbor complex, (b) to investigate tidal circulation characteristics of the present and proposed harbors, (c) to determine the optimum plan for future expansions to provide safe and economical berthing areas, and (d) to analyze the effects of proposed expansions on the existing harbors. (WES)
W77-02955

**TIOGA OUTLET WORKS, TIOGA AND HAMMOND LAKES, SUSQUEHANNA RIVER BASIN, PENNSYLVANIA; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
N. R. Oswalt.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 262, Price codes: A03 in paper copy, A01 in microfiche. Technical Report H-76-5, April 1976. 36 p, 7 fig, 8 photo, 9 plates.

Descriptors: *Hydraulic models, *Open channel flow, *Outlet works, *Riprap, *Stilling basins, Lakes, *Pennsylvania, Model studies.
Identifiers: *Tioga Lake(Penn), *Hammond Lake(Penn), Susquehanna River Basin(Penn).

A 1:25-scale model of the Tioga outlet works was used to determine the adequacy of the stilling basin to perform as desired for discharges up to 15,860 cfs, to study flow conditions in the exit channel, and to determine minimum riprap requirements for the exit channel. A schematic of the intake tower, the outlet conduit, the stilling basin, and about 600 ft of the exit channel were reproduced in the model. The original design stilling basin performed satisfactorily for discharges ranging from 2,000 to 14,000 cfs, however, flow separation and adverse vortex action occurred with lesser flows and a pulsating jump that overtopped the basin walls occurred with greater flows. Performance with low release rates was determined for both single- and double-gate operations. Recommended changes to the original design stilling basin included widening the basin from 55.5 to 72 ft, decreasing the flare of the outlet transition from 1 on 4,683 to 1 on 6, raising the basin apron 4.5 ft from el 1005.5 to 1010.0, raising the elevation of the sidewalls from 1043.0 to 1048.0, and lengthening the basin approximately 30 ft to the 38.64-ft-long horizontal floor at the outlet portal. The minimum size riprap required for stability in the exit channel was determined with the design discharge of 15,860 cfs. (WES)
W77-02956

**IMPROVEMENTS FOR MASONBORO INLET, NORTH CAROLINA; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
W. C. Seabergh.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-024 434, Price codes: A07 in paper copy, A01 in microfiche. Technical Report H-76-4, April 1976 (2 vol.). 416 p, 42 fig, 2 tab, 197 photo, 129 plates, 4 ref, append.

Descriptors: *Channels, *Channel improvement, *Hydraulic models, *Jetties, *Shoaling, *North Carolina, Model studies.
Identifiers: *Masonboro Inlet(NC), Tidal inlets.

The Masonboro Inlet fixed-bed model was constructed of concrete to scales of 1:300 horizontally and 1:60 vertically. The model reproduced an area extending to the -45 ft contour in the Atlantic Ocean and to the extent of the influence of the inlet in the bay. The wetlands were accurately reproduced near the inlet, but those relatively flat areas farther bayward were reproduced schematically and artificially bent into the research flume to provide storage for the tidal prism. Model verification tests assured that the model hydraulic and shoaling regimes were in satisfactory agreement with the prototype. Preliminary testing included the examination of tidal surface current patterns for various structural configurations, including training structures to deflect currents away from the north jetty, offshore breakwaters, and various south jetty alignments. This testing indicated that construction of south jetty would aid in maintaining a channel more centrally located between the jetties, away from the north jetty. The construction of a deposition basin in Banks Channel near the entrance of the inlet was also investigated. (WES)
W77-02958

**CHUTE SPILLWAY FOR COWANESQUE DAM COWANESQUE RIVER, PENNSYLVANIA; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
B. P. Fletcher.

Available from the National Technical Information Service, Springfield, VA 22161 as ADA-030 644, Price codes: A04 in paper copy, A01 in microfiche. Technical Report H-76-12, August 1976. 53 p, 12 fig, 2 tab, 9 photos, 10 plates.

Descriptors: *Dams, *Hydraulic models, *Spillways, *Chutes, *Pennsylvania, Model studies.
Identifiers: *Cowanesque River(Penn).

Tests to investigate the hydraulic performance of the chute spillway for Cowanesque Lake were conducted using a 1:60-scale model. Particular emphasis was placed on the development of a structure that would convey flow through the chute with a minimum of turbulence and waves. Flow approaching the structure from the left created a severe flow contraction at the left spillway abutment which became progressively more severe as the discharge increased. The flow contraction generated a standing wave that overtopped the chute sidewall. Flow distribution at the downstream end of the chute was unsymmetrical. Lateral flow from the left side of the exit area tended to concentrate the jet emerging from the chute along the right side of the exit channel, and velocities as high as 55 fps were measured. Model tests indicated that a stilling basin located at the downstream end of the chute would improve the performance of flow from the chute and in the exit channel. However, due to economic and structural considerations, a stilling basin was not considered feasible, and only preliminary stilling basin tests were conducted. (WES)
W77-02959

**BARKLEY LOCK PROTOTYPE TESTS CUMBERLAND RIVER, KENTUCKY,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
F. M. Neilson.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-012 767, Price codes: A06 in paper copy, A01 in microfiche. Technical Report H-75-11, June 1975. 90 p, 35 fig, 8 tab, 28 plates, 16 ref, append.

Descriptors: *Locks, *Kentucky, Rivers, Testing procedures, Model studies, Performance.
Identifiers: *Barkley Lock(Ky), *Cumberland River(Ky).

This report presents data obtained during prototype tests concerned with the performance of the 110- by 800-ft lock at Barkley Lock and Dam project, Cumberland River, Kentucky. Prototype measurements are continuous records of the following: (a) Pressures at 22 locations in the lock culvert system; (b) valve opening patterns; (c) valve leaf pressures and accelerations; (d) water-surface oscillations and elevation; (e) hawser forces and motion of a nine-barge tow moored in the lock; (f) valve-hoist strains and cylinder pressures; (g) miter gate opening; and (h) air-vent flow rates. The results are compared with a previous model study and include information on (a) prototype instrumentation and testing, (b) basic lock performance, (c) effects of various valve opening schedules on air venting, and (d) the response of a moored tow. The primary conclusions are that the prototype performance had been, reasonably predicted in the model study. (WES)
W77-02960

**CONNECTING CHANNEL FOR TIOGA AND HAMMOND LAKES, TIOGA RIVER AND CROOKED CREEK, PENNSYLVANIA; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
N. R. Oswalt, and G. A. Pickering.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-026 116, Price codes: A03 in paper copy, A01 in microfiche. Technical Report H-76-6, April 1976. 43 p, 5 fig, 13 photo, 12 plates.

Descriptors: *Channels, *Channel improvement, *Hydraulic models, *Open channel flow, *Outlet works, Weirs, *Pennsylvania, Model studies, Lakes.
Identifiers: *Tioga Lake(Penn), *Hammond Lake(Penn).

A channel will be excavated to connect the west side of Tioga Lake with the east side of Hammond Lake to permit the two reservoirs to be operated as one flood-control project. An overflow structure will be used to keep the drainage in Tioga Lake from entering Hammond Lake until storage in Tioga Lake exceeds the weir crest el 1101 ft msl. Normal flows from Hammond Lake to Tioga Lake will be controlled by an outlet works in the structure, and flood flows in this direction will pass over the weir. The model investigation was concerned with the adequacy of the connecting channel and its associated structure. The study was conducted in a 1:80-scale model which reproduced a portion of the Tioga and Hammond reservoirs, the connecting channel including a plunge pool, weir, and outlet works, and the Tioga Lake outlet works in the structure. Concerning flow from Tioga Lake to Hammond Lake, the efficiency of the uncontrolled weir was less than originally anticipated. The plunge pool as originally designed resulted in satisfactory flow conditions for all expected discharges. The model indicated that the uncontrolled weir was more efficient than expected for flow from Hammond Lake to Tioga Lake. Flow conditions were satisfactory for both uncontrolled weir flow and for flows through the outlet works stilling basin. (WES)
W77-02961

**GRAYS HARBOR ESTUARY, WASHINGTON, REPORT 6, 45-FT MSL (40-FT MLLW) NAVIGATION CHANNEL IMPROVEMENT STUDIES; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
N. J. Brogdon, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD A014 983, Price codes: A05 in paper copy, A01 in microfiche. Technical Report H-72-2, April 1976 (Report 6 of a series). 429 p, 39 fig, 20 tab, 12 photo, 313 plates.

Descriptors: *Channel improvement, *Hydraulic models, *Navigation, *Washington, Model studies, Estuaries, Salinity, Tidal waters.
Identifiers: *Grays Harbor Estuary(Wash), Ebb flow(Estuaries).

The existing, comprehensive fixed-bed model of the Grays Harbor estuary was used to determine the effects of enlarging (deepening and widening) the existing 35-ft-deep channel to a depth of 45 ft msl. One 45-ft improvement plan consisting of 23 groins and a relocated turning/settling basin was also investigated. Model tests were conducted on the above plans to determine effects on tidal heights, current velocities and patterns, salinity intrusion, dye dispersion, and channel shoaling. Some changes caused by the enlarged channel were: (1) Maximum current velocities were reduced by less than 0.5 fps. (2) Bottom ebb flow predominance was decreased along the navigation channel upstream from Crossover Channel. (3) Very littl change occrred in tidal heights or phase of tide. (4) Surface ebb flow predominance was increased along the entire length of the navigation channel. (5) Salinity values in the upper reaches of the estuary were increased, thus increasing upstream intrusion of the salinity wedge. (6) Dye concentrations resulting from a dye release at the bottom in the estuary entrance were increased throughout the estuary. (WES)
W77-02963

**NEW TECHNIQUES AND MATERIALS FOR CONSTRUCTING HYDRAULIC MODELS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8G.
W77-02964

**EFFECTS OF HURRICANE SURGE BARRIER ON HYDRAULIC ENVIRONMENT, JAMAICA BAY NEW YORK; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. F. Athow, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-030 638, Price codes: A12 in paper copy, A01 in microfiche. Technical Report H-76-14, September 1976. 264 p, 16 fig, 32 tab, 26 photo, 147 plates, 6 ref, append.

Descriptors: Hurricanes, *Barriers, Hydraulic models, *Surges, *New York, Model studies.
Identifiers: *Jamaica Bay(NY).

An existing comprehensive physical model that correctly reproduced tides, tidal currents, hurricane surges, and salinity distribution throughout the New York Harbor area and especially the Jamaica Bay complex was used to determine the effects of 13 different hurricane surge barrier plans on the hydraulic environment of Jamaica Bay. The study included tests in the model to determine: (1) The size of the ungated navigation opening that will provide the suppression required inside Jamaica Bay during periods of hurricanes and northeasterly storms; (2) the maximum current velocities in and near the navigation opening that will be experienced by navigation during normal tidal conditions; (3) the effects of the hurricane surge protection structure on tides, tidal currents, salinities, and pollution dispersion patterns within the bay for normal tide conditions; and (4) the minimum area of gated tidal passages required to maintain existing conditions in the bay with respect to salinities and pollution dispersion. (WES)
W77-02966

**PROTOTYPE TESTS, OLD RIVER LOW-SILL CONTROL STRUCTURE, APRIL 1973-JUNE 1975,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
F. M. Neilson, and A. R. Tool.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-030 971, Price codes: A06 in paper copy, A01 in microfiche. Technical Report H-76-15, September 1976. 114 p, 38 fig, 8 tab, 23 pl, 20 ref, append.

Descriptors: *Gates, *Hydraulic structures, *Prototype tests, *Vibration, *Louisiana.
Identifiers: *Old River Control Structure(La).

The following four separate series of prototype tests at Old River Low-Sill Control Structure are presented in this report. (1) High-flow vibration tests (4-5 April 1973), comprised of acceleration measurements, were made to determine the magnitude of the vibration of the structure under higher than normal flows. (2) Vibration monitor tests (16 April-1 June 1973), comprised of acceleration measurements, were made during a period in which the structure was not in a structurally sound condition. (3) Demolition tests (16-25 September 1973 and 4-15 November 1974), primarily acceleration measurements (with limited geophone and pressure cell data), were made during a period in which demolition activities (using explosive charges) were taking place near the structure. (4) Low-sill gate load tests (May-June 1975), comprised of measurements of strain, acceleration, load, and temperature, were made to determine the variations in loading that occur in the gate hoist mechanism and in the gate supports

during both typical and nontypical gate operation. Tests are briefly described and a limited sampling of the data is presented. (WES)
W77-02967

**RESISTANCE EQUATION FOR ALLUVIAL-CHANNEL FLOW,**
Geological Survey, Menlo Park, Calif. Water Resources Div.
D. E. Burkham, and D. R. Dawdy.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY10, Paper 12462, p 1479-1489, October 1976. 3 fig, 1 tab, 19 ref. append.

Descriptors: *Alluvial channels, *Flow resistance, *Sediment transport, *Turbulent flow, *Model studies, Analytical techniques, Equations, Sediment load.

The equation developed by Keulegan for resistance to turbulent flow in uniform rigidboundary conduits can be used (with reasonably accurate results) to represent resistance to turbulent flow in alluvial channels providing that a mathematical correction is made and certain channel conditions exist. The results of this study may be useful in eliminating some of the empiricism that was introduced to reduce bias in the modified Einstein method of computing total sediment load. (Woodard-USGS)
W77-02971

**DISCHARGE COMPUTATIONS AT RIVER CONTROL STRUCTURES,**
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02986

**STRATIFIED FLOW IN GREAT SALT LAKE CULVERT,**
Geological Survey, Salt Lake City, Utah. Water Resources Div.
E. R. Holley, and K. M. Waddell.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY7, Paper 12250, p 969-985, July 1976. 7 fig, 2 tab, 13 ref.

Descriptors: *Mixing, *Great Salt Lake, *Culverts, *Stratified flow, *Density currents, Model studies, Numerical analysis, Forecasting, Evaluation, *Utah.
Identifiers: *Great Salt Lake causeway culverts(Utah).

A causeway has effectively divided the Great Salt Lake in Utah into two lakes having different water-surface elevations and different densities. Exchange between the two lakes is by seepage through the causeway and by flow through two culverts. There are three possible flow regimes in the culverts: (1) Single layer; (2) arrested wedge; and (3) two-layer stratified flow. An analytical-numerical model is presented to predict which of the regimes will exist under given conditions to predict the discharges. Stratified flow analyses have normally assumed a horizontal water surface and small density differences. These assumptions are removed. An expanded definition of the densimetric critical conditions is given for large density differences. The model gives acceptable agreement with the 49 sets of field measurements of the culvert discharges. (Woodard-USGS)
W77-02987

**CONVECTIVE MODEL OF LONGITUDINAL DISPERSION,**
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02988

**DISPERSION--MISSISSIPPI RIVER BELOW BATON ROUGE, LA.,**
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02989

## 8C. Hydraulic Machinery

**ICE FLUSHING FROM ST. LAWRENCE SEAWAY LOCKS; HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02953

**BARKLEY LOCK PROTOTYPE TESTS CUMBERLAND RIVER, KENTUCKY,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02960

## 8D. Soil Mechanics

**STRAIN RATE EFFECT ON THE STRENGTH OF FROZEN SILT,**
Cold Regions Research and Engineering Lab., Hanover, N.H.
F. D. Haynes, J. A. Karalius, and J. Kalafut.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-021 981, Price codes: A03 in paper copy, A01 in microfiche. Army Corps of Engineers, Research Report 350, December 1975. 31 p, 23 fig, 4 tab, 16 ref, 3 append.

Descriptors: *Frozen soils, *Permafrost, *Compressive strength, *Tensile strength, Laboratory tests, Silts, Soils, Freezing, Strain measurement, Strength, Mechanical properties, Strength of materials, Strain, Cold regions, Cold weather construction, Soil mechanics.

Uniaxial compression and tension tests were conducted on frozen Fairbanks silt at a temperature of -10C. A relatively stiff testing machine was operated at a constant displacement rate for each test. The tests showed that compressive strength is very sensitive to strain rate and that tensile strength is relatively insensitive to it. The compressive strength increased ten times over a strain rate range of 0.00012/s to 2.9/s. As was found in other investigations, tangent moduli increased slightly with greater strain rates. The specific energy increased at higher strain rates for compression tests and decreased slightly for tension tests. For increased strain rates, uniaxial compression strength showed no tendency to plateau; nor did the specific energy reach a minimum during uniaxial tensile testing. (Sims-ISWS)
W77-02804

## 8E. Rock Mechanics and Geology

**OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK,**
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 6A.
W77-02831

## 8F. Concrete

**PERFORMANCE OF LIGNITE AND SUBBITUMINOUS FLY ASH IN CONCRETE - A PROGRESS REPORT,**
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
E. R. Dunstan, Jr.
Report REC-ERC-76-1, January 1976. 23 p, 6 fig, 6 tab, 14 ref. 1 append.

Descriptors: *Fly ash, *Concretes, *Lignite, *Pozzolans, Concrete additives, Air entrainment, Concrete mixes, Concrete testing, Cements, Coals, Compressive strength, Freeze-thaw tests, Elasticity(Mechanical), Deterioration, Shrinkage, Specifications, Concrete technology, Civil engineering.
Identifiers: Subbituminous coals.

Vast reserves of subbituminous and lignite coal will be used in power production in the United States in the years to come. A byproduct, fly ash, collected from the flue gases of coal burning powerplants will be produced in large quantities. Since bituminous coal fly ash has been used in concrete to considerable advantage for several years now, it is quite likely that similar use could be made of lignite and subbituminous coal fly ashes. If so, this material could provide a plentiful supply of a potentially low cost cementing medium for use with portland cement in concrete. Fly ashes were obtained from five western United States powerplants. A complete chemical and physical analysis of each lignite and subbituminous ash was made, and none was found to meet all requirements for a Class F pozzolan according to Federal Specification SS-P-570b. Concrete mixes were made with 15 and 25% replacement of cement, by weight, with these fly ashes and compared to a mix containing no fly ash and to mixes containing 15 and 25% replacement of fly ash meeting the requirements for a Class F pozzolan. The resulting hardened concrete was found to have adequate compressive strength, reduced drying shrinkage, and satisfactory freeze-thaw durability, but, in some cases, drastically reduced resistance to sulfate attach. (Sims-ISWS)
W77-02803

## 8G. Materials

**CORROSION OF SELECTED MATERIALS IN LAKE MEAD WATER,**
Nevada Univ., Reno. Desert Research Inst.
M. L. Miles, R. A. Huening, S. E. Green, and H. Dewey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 958, Price codes: A03 in paper copy, A01 in microfiche. Water Resources Center, Project Report No. 44, December 1976. 26 p, 2 fig, 8 tab, 6 ref, 2 append. OWRT A-069-NEV(1). 14-31-00016029.

Descriptors: *Corrosion, Materials testing, Lakes, *Nevada, *Colorado River, *Corrosion control, Aluminum, Alloys, Iron, Steel, Metals, Copper, Nickel, Oxidation, Rusting, Storage.
Identifiers: *Lake Mead(Nevada), *Corrosion rates.

Users of Colorado River water from Lake Mead are plagued with severe corrosion problems. Iron pipes in distribution lines and in homes have short duration. Brass plumbing fixtures suffer rapid dezincification resulting in grooved and leaky faucet seats, connectors to hot water heaters fail rapidly, service entrance lines are soon plugged, etc. This study was designed to measure the corrosion rate of materials used in systems treating and distributing water from lake Mead; and test available harmless treatments that might reduce the corrosive properties of this water supply. Corrosive attach of Colorado River water stored in Lake Mead is generally proportional to its velocity of contact

with aluminum, red brass, phosphorus bronze, silicon bronze, copper, Monel and Naval brass. Corrosion rate of alloys of copper, nickel and iron is related to the gases dissolved in the water. Removel of oxygen and other gases by nitrogen stripping generally reduced the corrosion rate of aluminum, silicon brass, Monel, silicon bronze and stainless steel. The corrosive rate of Colorado River water stored in Lake Mead on iron and steel is increased in porportion to (1) the availability of oxygen at the metal surface and (2) the velocity and acceleration either linear or directional of the fluid contact. (Fallon-Nevada)
W77-02832

**MODEL MATERIALS EVALUATION SAND TESTS; HYDRAULIC LABORATORY INVESTIGATION,**
Coastal Engineering Research Center, Fort Belvoir, Va., and Army Engineer Waterways Experiment Station, Vicksburg, Miss.
E. C. McNair, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-746 972, Price codes: A12 in paper copy, A01 in microfiche. General Investigation of Tidal Inlets (GITI) Report 7, June 1976. 270 p, 20 fig, 11 tab, 5 photo, 196 p1, 13 ref, append.

Descriptors: *Hydraulic models, *Sands, *Sediment transport, Model studies, *Materials testing.
Identifiers: Tidal inlets.

A laboratory investigation was performed to define responses of a natural quartz sand to various hydraulic conditions. The results demonstrate the performance of the material in a movable-bed model and, when compared with the responses of other materials, may provide a basis for the selection of optimum materials for various movable-bed modeling requirements. Twenty-one tests were performed with a 40-ft-long beach containing an inlet and with unidirectional, steady flows through the inlet substituting for tidal flows. The geometric characteristics of the inlet channel, beach profiles, inlet configurations, and material transport were observed for conditions with and without waves and for various magnitudes of flood and ebb flows. The tests showed that the minimum channel area, the channel width at the location of the minimum area, and the hydraulic radius at the location of the minimum area were strongly related to the rate of flow through the channel. The rate of material transport was found to be weakly related to channel flow rate, but the sparseness of data observations with time precluded definite evaluation of this. (WES)
W77-02938

**NEW TECHNIQUES AND MATERIALS FOR CONSTRUCTING HYDRAULIC MODELS,**
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
N. R. Oswalt, and G. A. Pickering.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-026 095, Price codes: A02 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-11, May 1976. 19 p, 1 fig, 8 photo.

Descriptors: *Hydraulic models, *Construction materials, Model studies.

Results of efforts to identify and evaluate new techniques and materials for constructing hydraulic models at the U.S. Army Engineer Waterways Experiment Station are reported. A literature search was made to determine types of materials available, and research personnel of other hydraulic laboratories were contacted by telephone and personal visits to obtain independent and additional evaluation. (WES)
W77-02964

## 8I. Fisheries Engineering

**PHYSIOLOGICAL RESPONSES OF RAINBOW TROUT (SALMO GAIRDNERI) TO ELECTROSHOCK,**
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W77-03026

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**EXPERIENCE IN CENTRALIZED COLLECTION, PROCESSING AND ANALYSIS OF SANITARY-HYGIENIC INFORMATION, (IN RUSSIAN),**
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For primary bibliographic entry see Field 5A.
W77-02908

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Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
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**POLLUTION ASPECTS OF CATFISH PRODUCTION - REVIEW AND PROJECTIONS,**
Georgia Univ., Athens. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5C.
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**LITERATURE STUDY OF SELECTED POTENTIAL ENVIRONMENTAL CONTAMINANTS, ANTIMONY AND ITS COMPOUNDS,**
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05C.
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**MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. CHROMIUM.**
National Research Council, Washington, D.C. Committee on Biologic Effects of Atmospheric Pollutants.
For primary bibliographic entry see Field 05C.
W77-02635

**MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. VANADIUM.**
National Research Council, Washington, D. C. Committee on Biologic Effects of Atmospheric Pollutants.
For primary bibliographic entry see Field 05C.
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**MOLYBDENUM: A TOXCOLOGICAL APPRAISAL,**
Karolinska Institute, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 05C.
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**THE ARCTIC COASTAL ENVIRONMENT OF ALASKA. VOL. II: A COMPILATION AND REVIEW OF SCIENTIFIC LITERATURE OF THE ARCTIC MARINE ENVIRONMENT,**
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05C.
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**ADVANCED WASTEWATER TECHNOLOGY, A SELECTIVE CODED BIBLIOGRAPHY,**
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
For primary bibliographic entry see Field 05D.
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Geological Survey, Champaign, Ill. Water Resources Div.
For primary bibliographic entry see Field 07C.
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